APRIL • 1961

FIREMEN

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Official NFPA Calendar Photo for 1962 — *see page 7*

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SUPPLY LINES AND MASTER STREAMS - page 12

MANHOLES, SEWERS - - - - - - - - - - - - page 14

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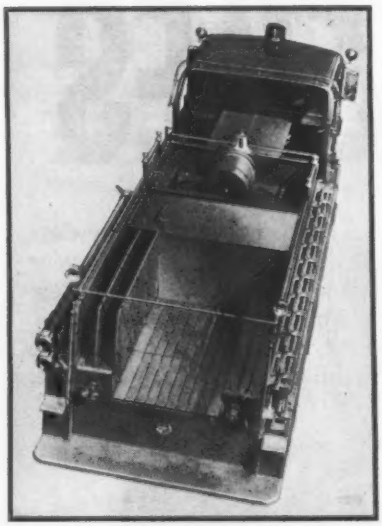

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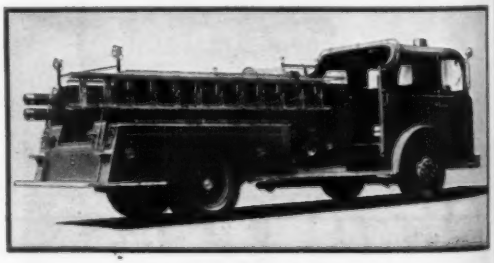

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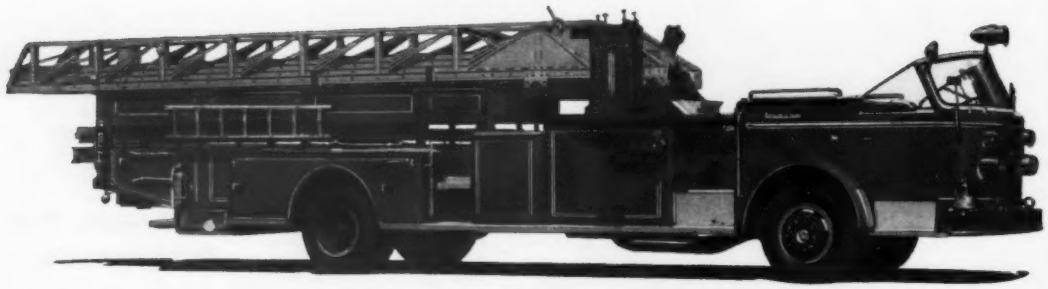

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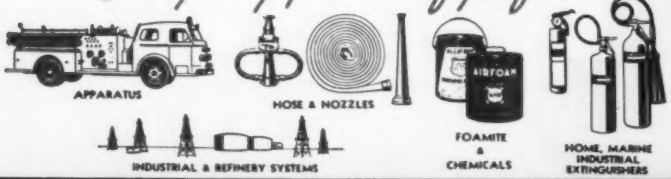

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FIREMEN

Volume 28 Number 4

A monthly magazine published for the fire service members of the National Fire Protection Association, 60 Batterymarch Street, Boston 10, Massachusetts.

FIREMEN magazine is available only through membership in the NFPA. Complete details on membership can be obtained by writing to the National Fire Protection Association, 60 Batterymarch Street, Boston 10, Massachusetts.

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A great many fire departments have the opportunity to burn abandoned or condemned buildings and thus get practical training in the many problems of fire control in this type of structure. From all indications, this beneficial form of training will be possible for a long time in the future, particularly in municipalities undergoing urban renewal programs.

Recently, one fire chief of national prominence had some practical suggestions concerning this training. "It is fairly routine," said he, "for the trained fire fighter to handle Class 'A' fires burning in the center of a room or in some easy-to-get-at section of the building.

"For the average fire department some of the most difficult fires are those which get going in the floors, walls or ceiling areas of buildings. Even though these fires may be small they can create a lot of heat and smoke, thus giving the fire department a real workout before control is established. We should be trying to create some of these fires when we burn condemned buildings for training purposes."

When burning these buildings, some fire departments are content merely to create a simple fire control problem and get the job done as quickly as possible. Others, however, have taken the time to create a variety of fire control conditions in the practice burning, as the chief has recommended. Much depends upon the imagination of the training officers in charge of the practice burning as well as upon the initiative and ability of the fire fighters who appreciate a tough fire control problem.

Fire service training is the theme of the official National Fire Protection Association calendar for 1962, as shown on this month's cover. Again, artist William C. "Bill" Griffith has created a scene of action that will impress members of the fire service everywhere. The NFPA calendar is published annually by Brown and Bigelow, Saint Paul 4, Minnesota.

This four-color calendar for 1962 is now being distributed. As in previous years, space is provided for imprinting the name of a fire department and telephone emergency numbers. The calendars are available in four sizes: a 29- x 43½-inch "jumbo" size, 18- x 27- and 14- x 21-inch sizes and a special 7¾- x 14-inch calendar for general distribution to dwellings. The larger calendars are primarily for business and mercantile display. Full information on the availability of the calendar can be obtained by writing to Brown and Bigelow at the above address.

The cover illustration is particularly appropriate since this month marks the beginning of fire service training activities. Throughout North America, state, provincial, regional and local fire service training meetings will be in full swing until the Fall. Accordingly, each month FIREMEN magazine will carry a listing of training dates so that readers will have time to make arrangements to take part in training activities in their respective areas. This month's listing of training dates will be found on pages 36 and 37 of this issue.

Coming up May 15–19 is the 65th annual meeting of the National Fire Protection Association. It will be held in Detroit, Michigan, with the Hotel Statler-Hilton serving as headquarters. Announcement of hotel accommodations and the tentative program of the meeting will appear in a forthcoming issue of NFPA *Fire News*.

Fire department personnel in states surrounding Michigan are urged to take part in this five-day meeting. As in previous years, firemen in uniform can attend without paying the customary registration fee.

WARREN Y. KIMBALL, Managing Editor; PAUL R. LYONS, Editor; HENRY S. GERE, Advertising Manager; ROWENA D. DORES, Editorial Assistant; SHIRLEY TOBEY, Fire Service Department; VIRGINIA STILES, Advertising Department.

Portland's new Seagrave apparatus includes seven 1,250 gpm pumpers and four 85-foot and two 100-foot aerial ladders.

FIRE DEPARTMENT GROWTH IN *PORTLAND, OREGON*

From a report from the Portland Bureau of Fire

THE Bureau of Fire in Portland, Oregon, is in the middle of a $3,000,000 modernization program. Planning for this began five years ago, but the program will not be fully accomplished for two or three years.

During the past few decades, Portland's growth pattern has been one of merging with separate outlying communities. Most of these were distinct municipalities, each with its own complex of commercial and residential facilities, including, in most instances, a "one station" fire department. The areas between these annexed municipalities gradually became subdivided and thickly settled, requiring fire protection. This was provided by filling in with neighborhood stations to complete the protection pattern. In many instances, these stations were spaced to provide reasonable protection based on the allowable running distances of horse-drawn fire apparatus.

For several generations, the distribution of fire stations developed as required by the exigencies of the day — with each new growth. As motorized fire apparatus replaced the horse, allowable running distances approximately doubled. After World War II, population pressures developed new areas badly in need of fire protection. Portland was confronted with a pattern of fire station locations unnecessarily close in older areas, and too sparse in the new growth areas. Some stations then in use were erected 50 years or more ago in districts once suburban. Industrial, business, highway, and neighborhood developments since that time completely changed the determining factors involved in station location, and the ratio and distribution of engine and truck companies became badly out of balance.

In the past, funds had not been available to make annual or biannual replacements of obsolete fire apparatus in the Portland Bureau of Fire. The Bureau requested necessary replacements each year but, due to taxing limitations, was invariably turned down because of lack of money in the city's normal budget. This had resulted in severe replacement cycles, or expensive replacement intervals. As a result, in 1958, Portland found itself with approximately 30 per cent of its apparatus over 18 years of age. Seven of twenty-four pumpers were 15 to 20 years old, three of eight ladder trucks were 15 to 30 years old, five of eight hose trucks were 15 to 20 years old, three of eight miscellaneous pieces of fire apparatus were 18 to 27 years old and all three fireboats were 31 years old.

Chief Harold E. Simpson, Bureau of Fire, Portland, Oregon

Underground, lead-sheathed cables (many of them 40 years old) of Portland's fire alarm equipment were breaking down as the result of normal deterioration. Frequent emergency repairs were required and new alarm circuits and extensions of communications to new fire stations were needed.

The last major overhaul and expansion of the fire alarm system was in 1928, when alarm headquarters were moved from the City Hall to its present location. This resulted in "patched-up" and expensive cable layout. The city has grown considerably during the past 33 years and limited funds hampered the efforts of the Alarm Superintendent to keep the alarm system in phase with growth and provide adequate maintenance and improvements.

Study and Planning

It became apparent to Portland's Assistant Chief Harold E. Simpson that to continue to add new fire stations to protect new growth areas without reducing the overlapping coverage in the older areas of the city would present a considerable and possibly unnecessary tax burden on the entire community. Chief Simpson

convinced Fire Chief Edward Grenfell (now retired) of the need for immediate planning toward a major fire department modernization and fire station relocation project. They approached Fire Commissioner S. W. Earl, who also recognized the need for such a program.

In July, 1956, he promoted Chief Simpson to Deputy Chief and instructed him to initiate a careful study of the city's fire protection requirements and make recommendations for operating economies and modernization within the Fire Bureau. Chief Simpson assigned five teams of fire officers to make separate staff studies of Portland's fire station distribution in relation to present and anticipated protection needs. All were instructed to use the principles set forth in *Municipal Fire Administration* (International City Manager's publication) and the requirements of the National Board of Fire Underwriters as criteria for the study. Each staff study group, working independently, produced strikingly similar solutions. After consultation with the planning teams, a preliminary station relocation plan was developed. After innumerable conferences and adjustments of the preliminary relocation by N.B.F.U. and Oregon Insurance Rating Bureau engineers, the City Planning Commission, the Federal Highway Coordinator and City Council, a final relocation and modernization plan was adopted. The necessary readjustment of fire station locations could not be made piecemeal without leaving many areas uncovered. It was therefore concluded to accomplish the modernization program in one coordinated project.

In addition to station relocation, the plan included a program for the replacement of obsolete tools, equipment, fire apparatus, a major overhaul of all three fireboats, and refurbishing of the alarm system.

Commissioner Earl directed that careful and extensive studies be made of the relative merits and costs of the several alarm system modernization proposals under consideration. It was his desire that maximum economy, reliability, and functional utility be controlling considerations. After several inspection trips, and considerable correspondence, a comparative analysis of the two primary types was accomplished. Based on economy and basic needs it was concluded to adopt a low cost "city owned" straight telegraph system employing dispersed repeating stations. It was determined that by the use of substations, cable construction and service costs would be reduced and the resulting dispersion of alarm facilities would increase reliability, particularly in time of war or disaster.

Solutions and Procedures

By this time, Chief Simpson had been elevated to Chief of the Fire Bureau (upon retirement of Chief Grenfell in July, 1957) and was in a position to see his modernization plan proceed toward fulfillment.

New fire station of Engine 5 and Truck 8 features a 1,250 gpm pump and 85-foot aerial ladder.

Stanley W. Earl, Portland's Commissioner of Public Affairs

It was concluded to be most practical and economical to borrow capital to finance the modernization program. A $3,000,000 Fire Bureau Facilities and Equipment bond measure was prepared to submit to the voters of Portland. The proposed expenditures were to be allocated generally as follows:

(1) $1,500,000 for the construction and relocation of 13 new fire stations and the remodeling of five or six others. Twenty-two old and poorly located stations would thereafter be abandoned, leaving a total of 31 stations, which would be six less than had been in use at one time with a smaller city.

(2) $900,000 for new fire apparatus and equipment and extensive overhauling of Portland's three fireboats.

(3) $600,000 for modernizing, refurbishing, and extending the fire alarm system.

Portland newspapers, churches, civic organizations and other responsible groups recognized the urgent need for these funds to continue a safe level of public protection and rallied in support of the improvement program. No organized opposition appeared against this measure. The measure was submitted to the voters in May, 1958, and was approved.

Immediately after the bond measure was approved by the voters, an architect was engaged and station planning was started. Additional conferences were held, bonds were sold, specifications were prepared for the purchase of apparatus and bids were taken. Land was purchased. Contracts were awarded for station and apparatus construction. Negotiations with the State Highway Department were initiated regarding station sites that were possibly in the path of new highway routes. Liaison with this agency is being maintained to preclude station location complications.

After agreeing on the type of alarm system to adopt, it was decided to call in a consulting engineer to advise the Fire Bureau how it might get the best results for dollars expended. His completed study confirmed that the work and planning thus far accomplished had been sound and efficient.

Briefly, the fire alarm system as adopted calls for decentralization of alarm facilities. Instead of all alarm circuits originating at fire alarm headquarters, there will be four substations strategically located.

By utilizing substations a minimum number of conductors are needed, running into the central fire alarm headquarters. Consequently, a great deal of the existing serviceable underground cable can be continued in use. Each substation will be equipped with automatic repeating mechanisms that cause the signals from all street box alarms to be recorded at fire alarm headquarters, from where the dispatching of fire fighting and emergency equipment will continue as usual.

The use of substations will permit almost indefinite future expansion of the system without necessitating the construction of a new and larger central fire alarm headquarters. The present obsolete switchboard facilities at alarm headquarters will be removed and new much smaller modern "dead front" circuit panels installed. The operator's desk will be replaced with a 26-foot console equipped with the latest devices to automatically record, date, and time stamp all alarms received and all transmissions dispatched by the fire alarm operators.

Plans for the outside plant of the alarm system call for the replacement of 1,200 miles of circuits with new wire. By switching much of the present overhead wiring to underground, 50 per cent of the outside circuit wire will be in underground cables at the conclusion of the project.

A total of 1,240 old fire alarm boxes of 1912 design will be replaced with the latest Gamewell automatic grounding boxes bringing the total in the system to 1,300. Of the new boxes to be installed, 140 will be master boxes at all school locations. To each of these the school authorities may make connection to allow an alarm to be transmitted from inside each and every school directly to the fire department alarm office. Portland will be among the first cities to have every school protected by such an alarm system. At present, 31 such master boxes are already connected to hospitals, convalescent homes and nurseries in Portland.

Accomplishments

To date, nine new fire stations have been completed. The first was occupied in September, 1959, and the most recent one in September, 1960. All of these, except two combination land and fireboat stations, are almost identical in design to take advantage of economies in architectural, construction and equipment costs. They are constructed of structural clay reinforced brick and each has 4,153 square feet of floor space. The buildings have no hose towers. Fire hose will be dried in electric hose dryers and stored in portable hose racks. Each station has a 20-year roof with 1½-inch insulation to retain heat in the building. Heat is by hot water with the building divided into four zones or areas.

Each station contains a garbage disposal unit and an automatic dishwasher.

A toilet and wash basin are installed in the basement for use by ladies of the election board and other similar needs. A shower stall is also included in the basement for use by firemen returning from fires.

Sprinkling systems in the lawn areas were installed by the regular fire department plumbers. All wiring and work relative to the fire alarm system was done by regular fire department electricians. At all times a man is on duty in the watchroom, immediately inside the public entrance. He is able to communicate selectively with all areas of the station by speaking into a microphone on his desk when he receives a fire alarm. This is in addition to the loud-speaker system which receives instructions and information directly from the fire alarm headquarters.

The main doors to the apparatus floor have automatic opening devices which can be activated from fire alarm headquarters. After the fire apparatus has left the building, the doors are set to close automatically three minutes after opening. A horn gives a 20-second warning before they close.

The automatic door opening and closing device includes an "electric eye" positioned to preclude accidental closing on any object which might remain in its path. In addition to conserving heat by closing the door, the electronic controls extinguish station lights and shut off the electric range. The apparatus floor is equipped with drive-through doors in the rear of the station. Thus, fire apparatus, when returning from a fire or drill, will drive directly in from the rear of the building, rather than stopping and backing in from the front with resulting traffic congestion. Each station can hold two pumpers and one aerial ladder truck.

Seven of Portland's thirteen new stations have the same design as this new station for Engine 14.

Soil conditions at the river front sites of the two combination land and boat station sites necessitated the employment of treated wood piling to support the reinforced concrete structural frames. Filler wall panels are constructed of lightweight concrete block and aluminum windows. The roofs are framed on steel joists with insulated roof decking and built-up roofing. Interior nonbearing partitions are finished in native woods. Vinyl asbestos tile floors are in all living and office areas, ceramic tile floors in all toilet rooms and colored cement in the apparatus rooms. These two stations each contain 5,500 square feet of floor space. Heating is by gas-fired warm air systems.

The fire companies operating from these combination stations will have both a water and land capability (amphibious) and will run either a fireboat on water or a fire pumper on land as the alarm operator may direct. This concept of a combination land and water company affords a fuller utilization of manpower. These new combination stations are now better located along the high value port and dock area than the old stations were and the three fireboats are more nearly equidistant along Portland's bustling and valuable waterfront.

The site on the west side of the Willamette River for one of these stations was leased from the Portland Dock Commission on a no-cost basis. The relocation of the other station on the east side of the river was dictated also by the East Bank Freeway, presently under construction. Money for the old station was recovered from the State of Oregon Highway Commission as a result of the condemnation preceedings. This all but paid for the new station and boat moorage.

Since passage of the $3,000,000 bond levy, four pieces of fire apparatus have been rebuilt into manifold trucks and sixteen pieces of new Seagrave apparatus have been purchased and delivered, including seven 1,250 gpm triple combination pumpers, three 750 gpm pumpers, four 85-foot aerial ladder trucks and two 100-foot aerial ladder trucks. With the acquisition of this new apparatus the oldest pumper now performing first line duty

was purchased in 1943 and the oldest first line ladder truck now in use was purchased in 1950.

The four manifold fire trucks were completely rebuilt from hose trucks released from service by the consolidating of fire companies. They have been placed in service in the high value district to meet grading schedule requirements for two-piece apparatus. Each manifold truck operates as a team with a pumper company and requires no additional manpower. All work on this reconversion project was done in Portland at approximately one fourth the cost of comparable new fire apparatus. These manifolds carry portable turrets and have six "take-offs" for working hose lines and four intakes to receive supply lines from the accompanying pumper.

Thirteen new pieces of Seagrave fire apparatus are powered by 315 h.p. Hall-Scott engines with five speed synchromesh transmissions. The three 750 gpm pumpers have 240 h.p. Hall-Scott engines. Apparatus assigned to hill areas have "no-spin" type differentials and are equipped with electric sanders for braking and traction on icy or slippery streets.

The new 1,250 gpm pumpers, equipped with high pressure booster pumps, carry 300 gallons of water. The 750 gpm pumpers carry 500 gallons of water. The new pumpers and aerial trucks are of "cab-forward" design with wrap-around windshields for better vision. The apparatus provides seats for five men, and each is equipped with a 100 ampere alternator, wired for "plug-in" cords to supply floodlights or other electrical equipment directly from the vehicle engine. Self-contained gas masks are carried on all this apparatus.

The two 100-foot aerials are tractor-drawn, and the four 85-foot aerials are of four-wheel design. Each aerial truck has a two-way intercommunication system from the man at the top of the ladder to the ladder operator at the base on the turntable. A dependable safety belt that allows maximum freedom of movement is provided for the man who operates a monitor nozzle from the top of the aerial ladder. Hydraulic rescue kits for prying apart wreckage, lifting heavy machinery or forcing access to a trapped victim are carried on all ladder trucks. They also carry smoke ejectors with explosion-proof motors of 5,000 cubic feet per minute capacity. Portable 1500 watt generators are carried to supply current for portable lights when used some distance from the apparatus, or when electrical outlets are not available.

Uncompleted Phases of the Program

Construction of three more fire stations is projected for the current year. Plans for two of these are nearly complete and bids will be called for in the immediate future. Construction will be completed before the end of the year. One of these, a prime multiple company station, will be located in the southwest commercial and apartment house area on a site already purchased. The present location of one of the companies to occupy this new station is in a deteriorated area nearby, where all buildings are now being razed to make way for the huge, new South Auditorium Urban Renewal project.

The second new station, also multiple company, will be located in a commercial and light manufacturing area of the East Side, abutting the present fire department drill tower. Each of these two stations will be two-story reinforced concrete with brick trim and will include oversize hose towers to be used as area hose depots. Each will contain district chief's quarters on the main floor in addition to company officers' quarters, watchroom and apparatus room. On the second floor will be the kitchen, recreation room, dormitory, locker room, etc. The station at the drill tower site will have a full daylight basement containing a double office for the drillmaster and his staff, a large classroom and other training facilities. The training company, the training staff, the drill tower and most other training facilities will thus be consolidated in this one area.

The third station will be located in the Marquam Hill medical facilities area to give quick response to this high value, high life hazard district. Included in the immediate area is the U.S. Veterans' Hospital, the University of Oregon Medical School, the University of Oregon Teaching Hospital, the University of Oregon Dental School, the University State T.B. Hospital, the Doernbecher Hospital for Children and the Multnomah County Hospital. This fire station is in the early planning stages with construction to start in the summer and completion scheduled by the end of the current year.

Another probable relocation of an existing station has been brought about by a recent decision of the State Highway Commission to widen the highway entering the Linnton District at the northwest city limits. A fire station housing a single pumper company is in the path of this planned project. Anticipating a reasonable return on this site from the Highway Commission a new relocated station will probably be built combining this land company with the third fireboat company as had previously been done with the other two boats.

Work is now under way on the remodeling of five or six existing fire stations with first priority for those which will house the new fire alarm substations.

Two 1,000 gpm pumpers are yet to be purchased, probably during the current year. At the present time, four 1,500 gpm pumpers are undergoing alterations. Booster hose reels and 200-gallon water tanks are being added to them. When this has been completed all pumper and engine companies in the department will be equipped with water tanks and booster pumps.

All three of Portland's 87-foot, steel fireboats which were built in 1927 will soon be repowered and overhauled. Contracts have already been awarded for the purchase of new marine engines and pumps. Bids will be called for in the near future for installation of this equipment. The boats will be taken out of service one at a time for this work. Each boat will carry four engines, two for pumping and two for propulsion. The pumps to be installed will each handle 3,500 gpm at 150 pounds pressure. On each boat the main midship turret which is now manually operated will be converted to operate pneumatically. Also on each boat a single-section, 30-foot, pneumatically operated aerial ladder will be installed. Each ladder will mount a 500 gpm turret at the top.

Commissioner Earl had decided to use a straight telegraph fire alarm system employing dispersed repeating stations or substations. Early in 1960 a contract was let for circuit wire and cable. Delivery is expected within the next few months. Near the end of 1960 the Gamewell Company contracted to furnish all necessary alarm boxes and equipment needed in refurbishing Portland's alarm system. Some substation equipment has already been received and is now being installed. By the end of 1961 all Gamewell equipment will have been received.

In addition to six linemen and two electricians that are permanently employed in the P. F. D. Alarm Division four more linemen and four utility workers will be temporarily employed, as needed, during the laying of circuit wire and the installation of alarm boxes. This entire project will be under the direct supervision of Alarm Superintendent C. S. Mulanax, and should be completed by the end of 1964.

SPEEDING THE ATTACK WITH SUPPLY LINES AND MASTER STREAMS

by Stuart D. Klinger, Beloit, Wisconsin

THE increasing use of preconnected 1½-inch lines has, quite logically, been accompanied by the practice of laying 2½-inch supply lines from the hydrant to the fire. To save time, the 1½-inch lines are usually supplied with water from the booster tank at first, then the supply line is uncoupled from the remaining hose load, and connected to a gated pump intake, after which the tank valve is closed, and water is furnished to the pump by the hydrant via the supply line.

Widespread use has proved the value of the supply line principle in attacking fires which can be extinguished with moderate amounts of water, but of what value is this principle in tackling the "big ones" in the high value district?

It is fascinating to speculate on the possibilities of the supply line evolution in launching a fast, hard-hitting attack with a master stream when the "first in" company is confronted by a major fire. Such an attack seems to be entirely possible whenever good water supplies are available at static pressures of, say, 80 lbs. per square inch and up.

The ideal apparatus for making this fast attack with a master stream would be a pumper equipped with a permanently mounted deck gun which is piped directly to the pump. Pumpers carrying "multiversals" which are mounted on a platform above the hose box will also suit our purpose if two short lengths (5 to 10 feet long) of 2½-inch hose are preconnected to the multiversal, and then coiled in a convenient place, so that they can be quickly attached to pump discharges.

Let's suppose that a pumper of a type just described is "first in" on a fire which has such a start that heavy streams are obviously desirable. This engine, carrying a split load of 2½-inch hose, lays two lines from the hydrant going in, and stops at a point permitting good use of its deck gun. After the two supply lines are attached to the pump intakes, the deck gun is immediately put to work, with a tip whose size is determined by the hydrant and length of lay. As we shall see later, this determination of tip size is done *before* the fire by actual test, or by test and calculation, for each hydrant in the high value district, and a card recording hydrant performance is carried on the pumper.

West Milwaukee, Wisconsin, Fire Department (John Pavlik, Chief) pumper, supplied by two 2½-inch supply lines 200 feet long, delivers 730 gpm through deck gun.

At this particular hypothetical fire, we find that our supply lines are 200 feet long. Consulting our hydrant performance card, we see that the hydrant we are using will supply 750 gallons per minute through two supply lines 200 feet long. We accordingly use a 1¼-inch tip, and operate at about 70 lbs. per square inch nozzle pressure. Picture the speed with which a well-trained crew could get 750 gallons of water on this fire!

Now suppose that our supply lines were 400 feet long instead of 200 feet; again consulting our hydrant card, we find that this hydrant will supply a little over 500 gallons through supply lines 400 feet long, so we choose a 1½-inch tip, and operate it at about 60 lbs. nozzle pressure. Or we can use a 1⅜-inch tip at about 85 lbs. nozzle pressure.

The alert fireman will be quick to perceive that a split load of 3-inch hose (preferably with 2½-inch couplings) would make possible greater volumes of water over longer distances. This system could be made still more effective if a single line of 3½-inch hose, say 300 to 400 feet long, was carried for supply line use.

We have said that, when using the supply line system for heavy streams, the determination of tip size is done before the fire, and a hydrant performance card is made up for quick reference on the fire ground. The most obvious method of obtaining data for our card is to actually lay out supply lines of varying length, and to check the amount of water our pumper can deliver (preferably by Pitot gage) through a master stream appliance, when the compound gage reads somewhere between 5 and 10 lbs. A drawback of this method is the time and labor required to lay, extend, and pick up hose lines at each hydrant being tested. There are other means of obtaining the information we desire, and the following two-step method may be preferred:

1. By means of a standard suction hose, attach a pumper equipped with a deck gun, or multiversal improvised to serve as a deck gun, to the hydrant being tested. Deliver 550 gallons per minute (since smaller amounts are hardly master streams) as measured by Pitot gage at the nozzle. Record the amount of water being delivered, and the corresponding hydrant pressure. The hydrant pressure can be observed by means of a gage suitably attached to an unused hydrant outlet, or it can be calculated by adding the compound gage reading to the friction loss in the suction hose. (To find suction hose friction loss, see NFPA FIREMEN for September, 1957.) Having recorded the 550 gpm flow, and the corresponding hydrant residual pressure, increase the delivery to 600 gpm and repeat the process. Continue to check hydrant pressure while increasing the

flow in 50 gpm increments, until reaching 1,000 gpm or more, as desired. The hydrant being tested might show the following characteristics:

Flow, gpm	Residual Hydrant Pressure, psi
550	74
600	73
650	72
700	71
750	69
800	68
850	67
900	65
950	63
1,000	61

This data tells us how much hydrant pressure is available to push a given amount of water through our supply line or lines. We are now ready to see how much water can be handled by supply lines of various lengths, and consequently what tip size should be used.

2. For the hydrant of our choice, let's see what can be done if we are using two 2½-inch supply lines 100 ft. long. Can we deliver 1,000 gpm with this set-up? Well, the flow in each supply line will be ½ of 1,000 gpm, or 500 gpm and the corresponding friction loss through 100 ft. of 2½-inch hose will be 54 psi. Since our hydrant will provide 61 psi at a flow of 1,000 gpm, it will, indeed, overcome 54 psi friction loss, and we will have a reading of 61–54 or 7 lbs. on our compound gage. We can accordingly operate a 2-inch tip at 71 psi, or a 1¾-inch tip at 121 psi nozzle pressure to deliver our 1,000 gpm. Since we only had a margin of 7 psi on the compound gage, 1,000 gpm is about the most that we can get from this hydrant through two 2½-inch supply lines 100 ft. long.

Now let's extend the two supply lines to a length of 200 ft. and see if we can get a flow of, say, 850 gpm. Each line will carry 425 gpm; the corresponding friction loss will be 2 x 41, or 82 psi. We cannot get 850 gpm through this set-up, because our hydrant pressure for a flow of 850 gpm is only 67 psi, and we need at least 82, preferably 87 to 90 psi.

If we try 800 gpm, we find that we are still a couple of pounds short of our requirements, so we drop to 750 gpm, and find that we can "make it" nicely, since the hydrant pressure of 69 psi provides a margin of 5 psi over (2 x 32) 64 psi friction loss. To deliver 750 gpm, we can use a 1¾-inch tip at 68 psi nozzle pressure, or a 1⅞-inch tip at 92 psi.

In the same manner, we can check the possible flow for other lengths of supply line, and make up our hydrant performance card as follows:

Length of Supply Lines	Maximum Flow—gpm	Tip Size and Nozzle Pressure
100 ft.	1,000	2" at 71 lbs., or 1¾" at 121 lbs.
150 ft.	820	1¾" at 82 lbs., or 1⅞" at 110 lbs.
200 ft.	750	1¾" at 68 lbs., or 1⅞" at 92 lbs.
250 ft.	650	1⅞" at 69 lbs., or 1½" at 95 lbs.
300 ft.	610	1½" at 84 lbs., or 1⅝" at 118 lbs.
350 ft.	560	1½" at 70 lbs., or 1¾" at 100 lbs.

Had one 3½-inch supply line been used, we could have supplied 560 gpm for 550 ft., 750 gpm for 300 ft., and 1,000 gpm for 150 feet.

While this method of supplying heavy streams does not make the most efficient use of the hydrant and water supply, it *is* efficient from the standpoint of time and manpower.

Since our system requires only one nozzleman (to control the deck gun), two men can be spared to make the hydrant if two supply lines are used. This permits a further improvement in our supply line system, for if a 4-way "Blake" valve is attached to one hydrant outlet, and a clappered siamese to another, and if we attach a supply line to each of these fittings, we can later put some real "punch" into these supply lines by hooking a second pumper to the hydrant attachments after the initial supply line attack has gotten under way.

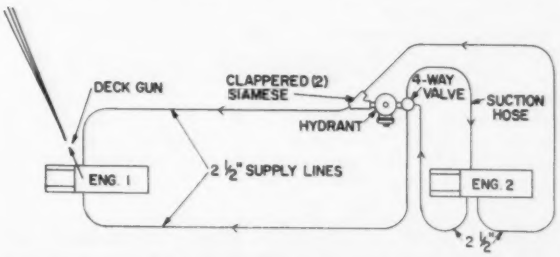


Diagram showing how a second pumper can be used to raise pressure in supply lines without interrupting the flow. Clappered siamese and 4-way valve are attached to hydrant before original supply lines are charged at hydrant pressure. Second engine can hook in later, as shown.

Suppose we have "made" the hydrant as described above, and stretched two 2½-inch supply lines 350 ft. long. We get to work immediately with a 1½-inch tip on our deck gun, delivering a little over 500 gpm, which is all our supply lines will permit. Later, we decide that we need considerably more water from the deck gun; how can we get the supply lines to provide a larger quantity? We can hook another pumper to the 4-way valve on the original hydrant. This will allow the second pumper to procure water from the hydrant via the 4-way valve, and to discharge it at pump pressure, into one of the supply lines, also via the 4-way valve. The remaining supply line can also be charged with water at pump pressure, by running a section of hose from a pump discharge valve to the unused inlet on the clappered siamese. Pump pressure will then open the clapper previously kept closed by hydrant pressure, and will close the clapper which formerly admitted hydrant water. This entire operation can be accomplished without any interruption of the water being supplied to the deck gun.

Operation at moderate original nozzle pressures of 60 to 70 psi will permit increased deliveries (200 to 250 gpm) by simply increasing nozzle pressures to around 125 psi, now that the supply is adequate. If we want to increase delivery by 400 or 500 gpm, it will be necessary to shut down long enough to change to a larger tip on the deck gun.

It would be a wise precaution for the pump operator to check the compound gage as soon as the pump is charged with water, but before opening the discharge gates. By this means, he will be able to determine the static pressure at the hydrant, and if it is lower than expected, the tip on the deck gun can be changed to a smaller size than originally intended, before going into operation.

FLAMMABLE LIQUIDS AND GASES IN MANHOLES, SEWERS

From NFPA Pamphlet No. 328M with the above title

Underground explosion in combination storm and sanitary sewer in Cleveland, Ohio, in 1953 killed one person, hospitalized 58 others, demolished 1.2 miles of pavement. *(Cleveland Fire Department photo)*

MANHOLES, sewers and similar underground conduits have long been recognized by fire protection engineers as constituting areas where fire and explosion hazards of some severity may exist. Modern civilization, accompanied by the increase in number of gasoline service stations, solvent disposal operations, dry cleaning establishments, fuel gas production and distribution facilities, refrigeration plants, and many other industrial activities with potentially dangerous gas or vapor by-products makes the safe operation of underground structures more difficult each year.

The probability of an explosion within an underground space is dependent on two factors: one, that the atmosphere contains a mixture of flammable vapor and air within the flammable range, and two, that there be a coincident source of ignition. Explosions occur infrequently because the proper mixture and the source of ignition are not present at the same time. For example, in the City of Los Angeles, which had approximately 140,000 manholes and vaults within the metropolitan, suburban and county areas, routine gas detection surveys made over a fifteen-year period prior to 1948 showed a total of over 9,000 vaults and manholes where the presence of flammable vapors was detected. In this period of time, approximately 1,000,000 tests were made. The experience report indicated that an average of less than eight explosions occurred annually within the area.

The severity of an individual explosion and its consequences are dependent on various factors. There is always present the possibility that any one explosion may result in a major catastrophe.

This report is limited to a study of the flammable liquids and gases found in manholes, sewers, vaults and similar underground structures. The underground structures include: Sanitary sewers, storm drains, water lines, fuel gas distribution systems, electric light and power conduits, telephone and telegraph communication lines, street lighting conduits, police and fire signal systems, traffic signal lines, refrigeration service lines, steam lines, and petroleum pipelines.

The term "underground structures" is not intended to include subways, tunnels and the substructural areas of buildings such as underground garages.

The purpose of this report is to give to enforcement officials, fire authorities, contractors and owners of underground structures guidance on problems involving flammable liquids and gases which may be found in underground structures.

The Problem.

With greater congestion today, the present trend in civic planning is directed toward the installation of all types of utility services beneath the street surface. This results in a continuous program of excavation and construction, with frequent damage to existing structures.

Sources of Ignition.

The possibility of flammable gases or vapors which may collect in underground areas being ignited is limited by certain fundamental conditions. The vapor must be mixed with sufficient air to make a flammable mixture, or it must be escaping into air at a point where a flammable mixture can be created. Heat of sufficient intensity to ignite the particular air-vapor mixture involved must be present at the place where a flammable mixture exists. Such heat may be caused by an open flame, an electric arc or spark, an incandescent heated particle, or a sufficiently heated hot surface.

The flammable limits of the gases and vapors which have been found in underground structures are listed in Appendix A. Flammable mixtures are formed when the concentration of these gases in air is between the minimum and maximum shown.

Flame: Any open flame is a potential source of ignition. These may be encountered in everyday work operations. Little control can be exerted over the casual sources of ignition when flammable vapors are escaping from or into underground structures. Such casual sources of ignition include burners and warning lanterns used by street surface maintenance crews, automobile exhausts, tar pots and pedestrian smokers.

Arcs: The heat of an electric arc occurring in electric underground structures may cause the distillation of insulating material producing flammable gases which in turn may be ignited by the arc itself when the proper air gas ratio is reached. This usually will occur when the arc

reaches a manhole or vault ofter having started in a duct. Other gases or flammable vapors, if present, may also be ignited by such an arc.

Static: Static electricity may be a source of ignition and its generation is generally greatest in an atmosphere of low humidity. The hazard appears when static accumulates to the extent that a spark discharge may occur. Static electricity may be generated when a liquid or gas under pressure escapes from a pipe at high velocity into an atmosphere of low humidity. Particles of dust, scale, and rust inside the pipe may become heavily charged with static and, if they impinge on an insulated body, the body will accumulate the charge and a spark discharge may occur.

Sources of Flammable Liquids and Gases.

The contributory causes responsible for the presence of flammable liquids and gases in underground structures are not generally appreciated. Investigations over a period of years on reported cases of flammable vapors detected in sewers, drains, drainage canals and telephone and electric power vaults have disclosed a diversity of products within the structures. The condition created by the existence of these gases and vapors can be grouped into two classes: (1) flammable and (2) injurious to life. The latter condition results from the toxic, asphyxiating or suffocating properties of the gases or vapors. Some of these liquids and gases fall into more than one class. However, this study will be limited to those liquids and gases that are of a flammable nature (see Appendix A). The release of piped oxygen, which may be present in underground structures, will accelerate the combustion of any flammable vapor.

Natural Gas: Natural gas means gas which originated from naturally occurring gas or oil-bearing strata. In oil and natural gas producing areas, cracks and faults in the underlying strata or abandoned wells may permit gas to permeate the soil and enter underground conduits and vaults. Within the boundaries of some cities there are actively producing oil and gas fields and many of these underlie developed areas, residential and industrial, where underground structures are now installed.

Fuel Gas: Fuel gases include natural gas, liquefied petroleum gases, coke-oven gas, coal gas, oil gas, carbureted water gas, water gas, producer gas and blast-furnace gas. These gases, except liquefied petroleum gases, have specific gravities lower than that of air so that when released in an underground space they will tend to rise and diffuse rather rapidly above the point of leakage. These gases when mixed with air within certain limits produce flammable mixtures. Since the oxygen content of each of these gases when not mixed with air is usually below 1.0 per cent, they may be classed as suffocating gases. With the exception of natural gas and liquefied petroleum gas, they are also highly toxic because of the high carbon monoxide content.

Natural gas and other fuel gases as distributed by utility companies in underground pipes are an extensive source of potentially flammable gas. These pipes may be subject to damage caused by corrosion, electrolysis, structural failures and adjacent excavating. These causes are discussed in greater detail in later paragraphs.

Refrigerant Gases: A number of the common refrigerants are flammable, for example, ammonia, methyl chloride, ethyl chloride, methyl bromide and ethyl bromide. With the exception of ammonia, all of these refrigerants in the vapor phase are heavier than air. Therefore, if they are released in large quantities in closed spaces, these heavy gases will flow downward into the lowest areas. Of these, only ammonia has a sufficiently strong odor in dilute concentrations to indicate its presence. Exposure to ammonia fumes may cause severe ammonia burns even at concentrations below the flammable limits. Liquid ammonia is often distributed through underground street pipes for refrigeration service in the business districts of many large cities. This system of pipes may be subject to the same exposure to physical damage as fuel gas pipes and petroleum pipelines.

Electric Cable and Other Insulating Material Gases: This source of flammable gas is practically limited to severely overloaded electric underground circuits. A breakdown of cable insulation will produce an electric arc. If the protective fuses do not operate promptly, this electric arc will continue. The heat of the arc may, by destructive distillation of cable insulation (varnished cambric, rubber or paper), produce flammable gases containing hydrogen, carbon monoxide and hydrocarbons.

Chemical Products: Accidental spillage in chemical processing plants and disposal of waste chemical products through sewers by industrial plants may be potential sources or contributing causes for explosive conditions. Examples of such products are carbon disulfide and ammonia. Calcium carbide will react with water to produce acetylene which is flammable.

Sewage Gases in Sewers and Drains: Sewage gas results from the fermentation or decomposition of organic matter. These gases can be produced when organic matter has settled as a solid in sewer lines caused by flat grades, crevices, sumps or obstructions where consistent flow of sewage is lacking, or as the result of bacterial action on wood or other organic material immersed in water. These flammable gases are principally methane, hydrogen sulfide and hydrogen and, on the basis of present evidence, they seldom reach explosive concentrations in sewers and drains. However, when they are mixed with other flammable liquids and gases present in sewers, explosive conditions may occur.

Flammable Liquids: Flammable cleaning solvents and compounds washed down drains by industrial and domestic users may be the media from which flammable vapors originate. Hydrocarbon liquids such as gasoline and kerosene in industrial plants, service station and garage wash racks are often sent to sewers and drains either accidentally or because there is no easier method of disposal. Any leaking underground tank containing flammable liquids such as a service station's underground gasoline tanks, may be a source of flammable vapors in underground structures.

Petroleum Pipeline Products: Liquid petroleum products and liquefied petroleum gases, are conveyed by pipelines installed beneath public streets and rights-of-way. These pipelines may be exposed to the same sources of physical damage as fuel gas pipes and these sources of damage are discussed in detail later. If any of these pipelines should fail, the escaping liquids and gases may penetrate substructure walls or rise to the street surface. Liquids may be washed into drains or enter the ventilating openings in the manhole covers of underground structures. Escaping liquid petroleum products may evaporate in the ground, penetrate the surrounding ground, or may enter a confined space to produce a flammable mixture.

Penetration of Structures by Gases: Flammable gas products present in the subsoil enter conduits, sewers, drains or basements because underground structures constructed of cement, concrete, brick or vitreous tile generally are not built to be impervious to gas. If a flammable gas or liquid is present in the soil, there is some likelihood that it may penetrate an adjacent underground structure. Gas may frequently enter the subsurface sections of buildings through or around any underground conduits that penetrate the substructure walls, and through abandoned gas lines that have not been capped or sealed. The distance that gas can move through man-made underground structures, while theoretically unlimited, has in practice been found to be limited but unpredictable.

Electric Circuit Oil Switches and Oil Insulated Transformers: This equipment is frequently installed in a street vault and electrical failures will occasionally result in an explosion. The action of protective devices in shutting off current is usually very fast, being of the order of two seconds or less. This has the effect of limiting the explosion, if one does occur, to the vault in which the failure occurs. However, when the vault is adjacent to or within a large structure, such an explosion may result in heavy damage.

Damage to Underground Lines.

Corrosion: One type of corrosion which occurs in gas lines and petroleum pipelines is where the soil composition and resistance is such that electric current from the development of local action cells can flow readily from anodic areas on the pipe surface through the soil to the cathodic areas on the same pipe. Such soil conditions may be due to acid or alkali content, organic matter, variations of water or oxygen content, soil type, or the presence of certain bacteria in the soil.

Corrosion may also occur as a result of chemical reaction between the pipe and surrounding soil. Electrolysis is another cause of corrosion in utility gas pipe and petroleum pipelines. Stray direct-current electric currents originate from two sources: 1. Direct-current electric railways and trolley lines using rails to carry return currents. 2. Industrial plant direct-current machinery using the ground as a return conductor. Underground pipes may pick up stray currents from cross connections with other structures carrying current. These currents may not be destructive where they enter the piping system. However, drainage of these stray currents to the ground may cause corrosion at these points of discharge.

Current drainage from these underground lines is controlled as effectively as possible by installation of drainage bonds and reverse-current switches, but the effect of these bonds and switches is mitigated by changes in railway traffic, alterations in underground structures, and damage to rail or drainage bonds. Under such situations the electric current may discharge from pipelines to ground, and if not detected and corrected, the pipe wall may be eventually penetrated.

Structural Failures: The allocation of insufficient space for the installation of underground structures may, in some situations, result in the encasing of gas and flammable liquid pipes in the walls of ducts and subsequently constructed masonry vaults. Such pipes from vaults under certain conditions may be fractured. Flood washouts, earthquakes and landslides may cause the dislocation and movement of ground and are often responsible for pipe fractures. Rupture of water mains due to corrosion, electrolysis or structural failure may, in turn, cause washout of soil that supports gas and flammable liquid pipes. Lacking support, these pipes may fracture.

Excavating: Contractors doing excavation work often encounter gas and flammable liquid pipes, and even though aware of their presence, workmen may unintentionally damage the pipe resulting either immediately or ultimately in a leak. Damage such as this is not always reported and often repairs are attempted by the party responsible for the physical damage which later may prove to be inadequate.

Unsafe Practices.

Before washing spilled petroleum products from street surfaces into drains or sewers, which may be a potentially dangerous action and often is an unlawful practice, other disposal means should be considered such as mopping up with sand, rags or mops. If, in an emergency, no alternative is available, disposal into a drain or sewer should be done only on the decision of a qualified person, after the Chief of the Fire Department has been notified.

Disastrous consequences may result from the thoughtless or deliberate dumping into drains of waste products which are either directly flammable or which by reaction with organic matter in sewers may produce a flammable mixture. Though the presence of a flammable material may be detected, its source often is difficult to determine.

Protective Practices.

The adoption of protective measures which will detect the presence of flammable products in manholes and vaults, and provide the means to prevent the accumulations of gas within the explosive range, should reduce the incidence of explosions in underground structures. Such a defensive procedure is necessary because of the difficulty of eliminating the flammable material at its source.

Numerous sources of ignition may be found in underground structures. The operators of underground structures by eliminating the use of flames in suspected areas may materially reduce the number of ignitions. Experience has shown, though, that fire and explosion incidence can best be reduced by the elimination of flammable vapors from the atmosphere of the underground structure. It is all but impossible to remove all ignition sources.

Considering the diversity of contributory causes for flammable products in underground structures, protective practices should be designed to reduce to a minimum the quantity of flammable vapors. Where such vapors are found to be present, a complete purge of the manhole or vault atmosphere should be made and the source of the flammable vapors eliminated. Manholes and vaults should be ventilated by forced draft when necessary to prevent concentrations of these vapors within the explosive range. After complete ventilation of the underground structure, the atmosphere should be tested with a combustible gas indicator before entering and before any hot work is performed. A positive reading on the combustible gas indicator does not necessarily mean that the toxicity hazard has been eliminated. Adequate ventilation should be maintained and periodic gas analysis of the atmosphere during any such work should be made.

There are a number of instruments that can be used to detect unsafe atmospheres found in underground structures. They should be used to determine the characteristics of any questionable situation.

Oxygen: A safe practical method of testing an atmosphere for oxygen deficiency is by means of the flame safety lamp, or the oxygen deficiency indicator which is an adaptation of the flame safety lamp. Conventional flame safety lamps should never be used to test an atmosphere which is suspected of containing hydrogen or acetylene. Similarly, the oxygen deficiency indicator should be used only in safe atmospheres. The flame of the lamp is extinguished when the oxygen content of the atmosphere is less than approximately 16 per cent. Such an atmosphere is considered hazardous to human life. There are other instruments that give a direct reading of oxygen deficiency or excess. One dependable instrument of this type operates on the basis of the paramagnetic quality of oxygen.

Carbon Monoxide: This gas in concentrations greater than 0.10 per cent by volume results in unconsciousness in little more than an hour and death in four hours. Further increases in concentration reduce this time element. Its effect is to displace oxygen in the blood stream. Several instruments have been developed for the quick detection of carbon monoxide. Those capable of detecting the smallest concentrations considered hazardous are the carbon monoxide tester (palladium-molybate complex) and the carbon monoxide indicator.

Hydrogen Sulfide: This flammable and toxic gas is colorless and has an odor resembling rotten eggs. It is toxic in concentrations in excess of 0.002 per cent by volume. Continued exposure will paralyze the olfactory nerves. The hydrogen sulfide detector will detect the low toxic concentrations of this gas.

Fuel Gases and Vapors from Flammable Liquids: Combustible gas indicators are available in a number of different types to meet the requirements of the specific use to which they may be applied. The three most common types are (a) an "all-purpose" instrument suitable only for

the detection of flammable gases such as natural gas, manufactured gas, hydrogen and acetylene and all vapor air mixtures associated with fuel oils, gasoline including leaded gasoline, alcohols and acetones. This instrument indicates the presence of these gases and vapors only. (b) A specific instrument is available for use on the specific gas or vapor-air mixture for which it is calibrated, such as natural gas, manufactured gas, hydrogen or acetylene. Such an instrument is usually calibrated in the range of zero to slightly above the lower explosive limit of the specific gas or vapor. This instrument is not an all-purpose instrument and is designed for use only on the gas or vapor on which it is calibrated. (c) A specific instrument is utilized principally by gas utilities for use in pinpointing leaks in underground mains and services. This instrument must be calibrated on the specific gas being sampled, i.e., natural or manufactured gas and has a scale range of zero to 100 per cent gas. A portable combustible gas indicator is also available for operation in explosive atmospheres.

Periodic surveys with instruments should be made of the atmosphere of all water, gas and electric underground structures for the presence of flammable vapors. The frequency of such surveys will depend upon the previous experience and the potential hazard.

Liquefied petroleum gases and utility gases are odorized to facilitate detection unless the gas possesses a distinctive odor to the extent that its presence is readily detectable or where the odorant would serve no useful purpose as a warning agent. Utility gases should be odorized in accordance with Paragraph 861 of Section 8 of the ASA B31.1 Code for Pressure Piping and Liquefied Petroleum Gases in accordance with Section B.1 of NFPA Standard on Liquefied Petroleum Gases, No. 58. Experience has shown that odorants can be absorbed in traveling through the soil.

Volatile flammable liquids may have accidentally entered a drainage system because of a spill or other emergency. Steps should be taken to minimize the hazard by exhausting the vapors with blowers or exhaust fans driven by explosion-proof motors and by pumping out the liquid with pumps equipped with explosion-proof motors. Floor drain openings into buildings in the area of the spill and for some distance downstream should be checked for escape of vapors. Water should be placed in any dry traps to seal them. Copious quantities of water should be used to flush any flammable liquid through the system quickly and to dilute it, if miscible with water.

Prior to laying a pipeline, a suspected electrolysis area should be examined rather than to explore for leakage after piping has been damaged. Where electrolysis or corrosive soil conditions are known, owners of pipelines that carry flammable products through such soil should take measures to arrest electrolysis or corrosion. Protective measures against corrosion should be taken in cooperation with other owners of nearby underground structures which would be adversely affected by unilateral action. If damage is suspected, surveys may be made by testing all available underground structure street openings with combustible gas indicators, by noting the condition of vegetation, by pressure drop tests, by soapsuds testing on exposed pipe and fittings and by bar test surveys. The bar test survey requires extra care to prevent damage to underground structures.

Service stations with underground tanks of gasoline may be a source of leakage of flammable liquids. When a service station tank is found to be leaking, its contents should be removed immediately. When such a tank is taken out of service, abandoned or removed, the procedures described in NFPA No. 30-F, Abandonment or Removal of Underground Tanks, should be followed.

Appendix A.

PROPERTIES OF FLAMMABLE LIQUIDS AND GASES WHICH HAVE BEEN FOUND IN UNDERGROUND STRUCTURES.

	Flash Point Closed Cup Deg. F.	Flammable Limits in Air % by Vol. Lower	Upper	Specific Gravity of Liquid (Water=1)	Specific Gravity of Vapor (Air=1)
Acetone	0	2.6	12.8	0.79	2.00
Acetylene	Gas	2.5	81.0	.....	0.90
Ammonia	Gas	16.0	25.0	.....	0.58
Benzene	12	1.4	7.1	0.88	2.77
Blast-furnace Gas*	Gas	35.0	74.0	.....	1.01
Butadiene	Gas	2.0	11.5	0.62	1.87
Butane	–76	1.9	8.5	0.60	2.01
Carbon Disulfide	–22	1.3	44.0	1.30	2.64
Carbon Monoxide	Gas	12.5	74.0	.....	0.97
Coke-oven Gas*	Gas	4.4	34.0	.....	0.38
Ethane	Gas	3.0	12.5	.....	1.04
Ethyl Chloride	–58	3.8	15.4	0.91	2.22
Gas Oil*	150	6.0	13.5	1.31	.....
Gasoline (Values may vary for different grades of gasoline)	–45	1.4	7.6	0.75	3.–4.0
Hydrogen	Gas	4.0	75.0	.....	0.07
Hydrogen Sulfide	Gas	4.3	45.0	.....	1.18
Kerosene	100–165	0.7	5.0	1.0	.....
Methane	Gas	5.3	14.0	.....	0.55
Methyl Bromide	Gas	13.5	14.5	1.73	3.27
Methyl Chloride	Gas	10.7	17.4	0.92	1.78
Natural Gas*	Gas	4.5	14.5	.....	0.65
Petroleum Naphtha*	20	0.9	6.0	0.75	3.75
Producer Gas*	Gas	14.1	95.6	.....	0.86
Propane	Gas	2.2	9.5	.....	1.56
Toluene	40	1.4	6.7	0.87	3.14
Water Gas* (Carbureted)	Gas	5.5	46.2	.....	0.68

*These flammable liquids and gases are mixtures and their properties may vary depending on the composition.

The functional purpose of underground structures as well as the design require different procedures for the elimination of flammable gases, though the means of detection are similar. Where flammable products may have originated within the structure, as in sanitary sewers or electric vaults, the elimination of the cause is a distinctly different problem than if the flammable product entered the structure from the outside.

Sewers and drains should be periodically flushed and cleaned to prevent deposits of organic material and slime growth. Periodic inspections should be made of industrial plants to prevent the discharge into sewers of waste that might produce explosive gases due to physical or chemical impurities, high temperatures, alkalinities or acidities.

Periodic checks should be made of protective equipment in underground electric systems. Efforts should be made to prevent the overloading of cables and to avoid arcing conditions that may be causing the source of flammable gas by the breakdown of insulation. Fusing and arcing should be prevented, too, because they furnish a source of ignition. The efficiency of all rail bonds on tracks of electrified railway systems should be checked to insure that the potential gradient of the rail system is at a minimum.

In addition to the text on these pages, NFPA Pamphlet No. 328M contains a summary of information particularly important to municipal officials and agencies, and Appendix B, an analysis of a number of explosions in underground structures. The pamphlet is available for 25 cents per copy.

REGIONAL ROUND-UP

A spot check of progress and plans of NFPA member fire departments and other fire service organizations in various regions.

Tucson, Arizona, is faced with a fire protection problem common to other booming U.S. municipalities. In the past 10 years, the city has increased in area from 9.5 to 71 square miles, with population jumping from 45,454 to 212,892. To provide adequate fire department service for this tremendous growth, reports Tucson's Fire Chief J. H. Freeman, a number of changes are under way.

Temporary fire stations are serving some of the annexed areas, pending construction of permanent stations, one of which is scheduled for opening this July. Part of a $10 million bond issue is being used to improve and extend the water system. Equipment is now going into a new Central Communications building, for fire, police, and public works dispatchers. This includes telephone switchboard facilities, control and microwave equipment connecting to a transmitter and receiver site on nearby Catalina Mountains, and selective alerting and dispatching for fire companies. Complete standby radio will be provided in case of failure of the main system. Two alarm dispatchers will be on duty at all times.

The fire department has just completed a 50,000 dwelling inspection program, started last Fire Prevention Week. Eighty members have also completed a course in municipal fire administration, sponsored jointly by the City, the Adult Evening School and the International City Managers' Institute.

Expansion has also been a problem for *Phoenix*. Fire Chief Harold H. Dean states that in the past twenty years, Phoenix "exploded" from 9.6 to 188.4 square miles, and from 65,414 to 439,170 population. Most of this growth has been since 1950. Long-range planning of fire department needs for the next twenty years has just been completed. Some anticipated items: 28 new fire stations (3 others to be relocated), 6 additional ladder companies, 3 more squad companies, a new training area, plus expansion of radio communications equipment.

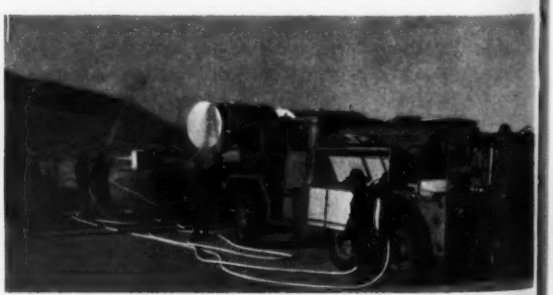
Many changes also reported in department training, recruitment standards, and equipment. "After the experience of the past few years," says Chief Dean, "meeting the challenges of the future should be a snap!"

Also from *Phoenix* comes a report from William R. Woodfin, Supervisor of Industrial Education, who handles the State's firemen's training program. Coming up, says he, is the 9th Arizona State Fire Training School, October 19, 20 and 21. Already scheduled: radiological monitoring, new fire films, new tools and equipment, plus program speakers.

At the FDIC in Memphis (see pages 22 to 24), Commander Tom Keane, Boy Scouts of America, gave an inspiring talk, touching upon the growth of the Scouts and the expansion of fire department support of troop activities. Typical case: the volunteer fire department in Kingman, Arizona, which recently became the sponsor of Boy Scout Troop 28, Boulder Dam Council. Fire Chief is W. L. Casson.

In this State, the Department of Forestry and Fire Control and the U.S. Forest Service depend upon the assistance of local fire departments to handle the wildland fire suppression problem. In the Wasatch front area, from Santaquin on the south to Brigham City on the north, the fire departments serve as first attack forces on wildland fires, then are relieved when forest service replacement crews can be dispatched.

Last summer, reports Richard P. Klason, Assistant State Forester, Fire Control, the *Salt Lake City Fire Department* provided manpower for mixing bentonite solution for air drops on fires. The department also furnished a stand-by truck for boosting hydrant pressure for the mixing job. The *Salt Lake County Fire Department* is the first one in Utah to get a bulldozer



At the Tonopah Air Base in Nevada, the fire department, headed by Fire Marshal Tim Gilbert, has this 1,000 gallon tank truck with a low pressure pump, hose and other equipment. In addition to serving the base, the tank truck responds to all major fires in nearby Tonopah in the mutual aid program.

for wildland fires. Complete unit — truck, trailer, and dozer will be in one of the foothill fire stations for immediate response. Fire departments in northern part of State have seven special pieces, from a ¾-ton 4 x 4 truck with 150 gallon tank to a 2,000 gallon tanker, primarily for wildland fires, but can be used on structural fires as well. Cooperative agreements between forestry and community fire departments have been worked out for use of such apparatus as well as aerial tanker operations.

Coming April 28 and 29 in *Reno* is the First Nevada Senior Fire Officers' Conference, reports H. B. Matherly, State Fire Service Instructor. Also scheduled, for June 22–24, is the State Firemen's Convention, to be held in *Lovelock*. Last year, 636 men from 30 volunteer fire departments took part in the State training program. Typical were the *Yerington* and *Pioche* Fire Departments which had 3-hour training sessions at night, and the Indian Agency volunteer fire department in *Stewart*.

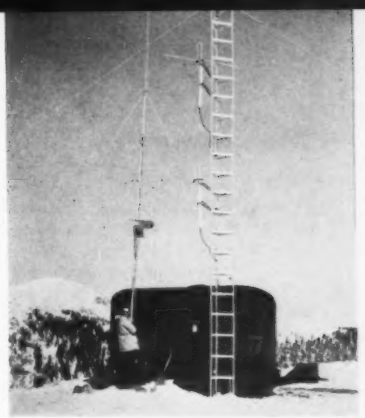
In *Henderson*, Chief W. D. Richard commands a fire department of fourteen paid men and five "reserves." These five are high school seniors who study with a "Distributive Education" instructor. They are assigned to a 7 A.M. to 7 P.M. fire department shift, with a day off every two weeks. They study two hours per day and once a week get a four-hour outside training session in fire ground evolutions. City pays them a nominal fee and they are covered by State for insurance. They also receive educational credit for their work with the fire department.

Fire department has two 1,000 and one 750 gpm pumpers. Also operates an ambulance service.

In the forestry field, Deputy State Forester John L. Artz reports that the Nevada Division of Forestry started an air tanker program last year with the U.S. Forest Service and the Bureau of Land Management. Two C-45 "Twin Beech" aircraft are in use, one as an aerial tanker, the other for patrol and cargo dropping. A TBM is under contract for the high danger period. Last year, these tanker planes operated with considerable success on 16 fires.

The Division also operates two 15-man Honor Camps in the high hazard area. State Prison inmates work in these camps for fighting fires, maintaining equipment, and forest conservation. Results last year warranted increasing each camp to 25 men in 1961.

Members of the Sparks, Nevada, Fire Department practice rescue techniques wearing self-contained breathing apparatus.



Installation of repeater station on Tesuque Peak, New Mexico.

From Chief Bob Stockwell of the Carlsbad, New Mexico, Fire Department comes word of changes.

The department, with 14 paid men, 30 volunteers, protects a city of 26,000 population. Apparatus includes three 500 and two 750 gpm pumpers, a tanker, a rescue truck, a "jeep" and the chief's station wagon, all two-way radio equipped. Recently, tone-activated radio units were installed for the two fire stations, the men's homes, and a rural fire station west of Carlsbad. Tone generator operates on the assigned radio frequency of 154.31 mc and sends three different tone frequencies — 1700, 1900 and 2100 vibrations per second, the latter for the chief's home receiver only. Dispatcher can contact chief or all the men, also activate siren for rural station. Last year, department answered 484 alarms for fire and other emergencies, won the NFPA Fire Prevention Contest award for top program in New Mexico, bought pickup truck and other equipment, sandblasted and painted No. 2 fire station, conducted fireworks demonstration on July 4th for public.

The Department of State Forestry, headed by Ray L. Bell, now has eleven employees, including Forest Fire Chief Arthur J. Riggs. Chief Riggs reports that private and state land under the Department's protection has increased from 88,000 acres in 1958 to 262,000 acres last year, and by the end of 1961 is expected to be nearly one-half million acres. Big achievement for the Department was the installation of a repeater station on 12,000 foot high Tesuque Peak, 18 miles northeast of Santa Fe. Tower, radio equipment, 12-KW generator, steel quonset hut and other items had to be trucked to peak by "6 by 6's," last three miles with no road and 30 per cent grade. One, possibly two, more stations are planned for future.

Dispatcher's desk of Carlsbad, New Mexico, Fire Department showing telephones, radio microphone and selective tone signaling equipment.

The Query —

Dear Sir:

I would like to obtain clarification of a point made in the November, 1960 issue of FIREMEN magazine. In the article entitled *How to Identify Fire Causes* (Part Two) the author states:

"Television booster tubes occasionally cause fires. Some of them double the voltage which greatly increases the heat and may ignite the cabinet or curtains, etc., at the back of the set. This increased voltage also may overload and break down the transformers."

I assume that what is intended here are TV picture tube filament boosters and not "booster tubes" as stated in the article. The only booster tubes that I know of that are used in a TV set are additional stages usually used in the I.F. (*intermediate frequency* — Ed.) strip to increase the gain in fringe areas. Although these draw current they do not double the voltage. If what is intended are really picture tube boosters then the statement that they "double the voltage" is untrue.

For example, if a filament is rated at 6.3 volts, then a booster will increase this to 7.8 volts. If the voltage were actually doubled, that is, if 12.6 volts were applied to the filament and the set turned on, the filament would disintegrate as soon as the high voltage were applied to the anode. This is due to the filament being in a near liquid state as a result of doubling the filament voltage. A tube only undergoes this type of treatment when a serviceman is attempting to rejuvenate it, and then only under carefully controlled conditions.

Many boosters are used on picture tubes for other reasons than to increase filament voltage. For example, they are used to relieve inter-element shorts, to apply the signal to other elements when one becomes damaged or in cases of heater to cathode leakage. Used in this manner no voltage boosting is involved.

Some manufacturers build a "booster" right into the set. That is, the picture tube filament is in parallel with a resistor. When the tube ages and emission decreases from the filament, then the resistor is removed from the set and the current it carries goes through the filament instead.

It is my belief that some of these fires that were believed caused by the booster igniting curtains at the back of the set were actually caused by the curtains, themselves, cutting off air circulation to the set. In some models there is barely enough allowance made to circulate air even when there are no obstructions. When this small amount is cut off, then the temperature can increase quite rapidly.

Except for this point, I enjoyed the article very much. It was very well written and contained much of interest to firemen. I am not, as you perhaps might have assumed, a manufacturer of boosters. Like the author, I too, am a fireman interested in correctly identifying causes of fire.

Yours sincerely,

JACK BROWN
Lewiston, Idaho

MORE INFORMATION ON FIRE CAUSES

Reader's inquiry brings interesting response from Chief Investigator C. W. Stickney concerning article "How to Identify Fire Causes." The article, published in three issues of FIREMEN Magazine last year, is now available in reprint form, 50 cents per copy, from NFPA Publications Department.

Back of TV set ignited by picture tube booster.

The Reply —

Dear Sir:

I would like to thank Mr. Brown for his letter of inquiry concerning the voltage of picture tube boosters. I was not previously aware of this error. The voltage increase in the use of these boosters is about 20 to 25 per cent. This was confused with information we received concerning the voltage used in the rejuvenating process which doubles and sometimes triples the voltage for short periods of time.

These picture tube brighteners or boosters are actually small transformers, and it would appear that if manufacturing standards are adequate and they are used on properly functioning sets they would give no trouble. However, some of these do get very hot, and we have had several small fires which could be traced directly to these burned-out boosters; and a number of others where the boosters appear to have been a factor.

(Left) This iron had been connected for only 15 minutes prior to failure.

(Right) This iron had been on for at least two or three hours prior to failure.

but it could not be determined definitely due to the extent of damage.

I am enclosing the photograph of a set which was examined by city and state electrical inspectors as well as by a representative of the Underwriters' Laboratories. In this one the overheated or burned-out booster ignited the pressed board back of the cabinet; but the condition — or, probably, chain of conditions — which caused the booster to overheat has not been definitely established as yet. There was no visible fusing or electrical arcing.

We are continuing to examine our TV fires carefully (45 in Portland last year), and hope to have more definite information later on. So far as I can determine at present, these boosters are not listed by UL, and the home installation of such devices is not recommended by any of the major picture tube manufacturers. There appears to be a wide price variation in these devices and this could indicate a wide variation in manufacturing standards or quality. Last year the sale of some brands of *antenna* boosters was prohibited here, although at least one other type has since been approved. Perhaps there is some corollary in this.

I agree with Mr. Brown that ventilation is a problem. Heat, in general, appears to be the main factor in TV failures. Besides the blocking of ventilation louvres by curtains and drapes there are also some other factors which retard the dissipation of heat, such as decorative scarves, etc., on sets; accumulations of dust and lint in screen-covered vents; dust, lint and condensation on internal parts; and we have found some sets being operated continuously for weeks at a time without being turned off in the belief that the set would last longer.

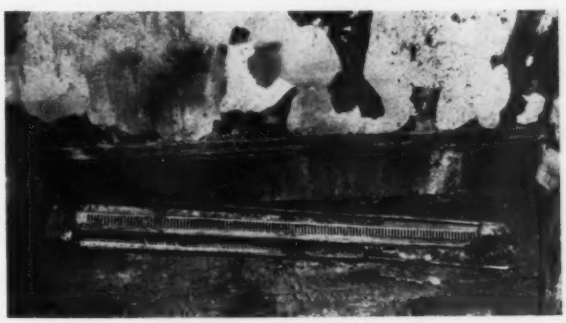
Recently we have had several serious fires from misuse of electrical equipment occasioned by a failure to realize that, with many electrical devices, adequate ventilation, or a means for dissipation of heat, is often the only safety factor or margin between normal, safe operation and fire. In other electrical devices, a thermal control is the main factor that prevents a continuously rising temperature and, eventually, a fire.

Many of these devices, such as blankets, baseboard space heaters, vaporizers, light globes, etc., depend entirely on the dissipation of heat to keep the surface temperatures within a safe range, although the core of the device or heating element may be operating at many times this temperature and well above the ignition temperatures of surrounding combustible material. When the normal dissipation of this heat is prevented by some type of insulation the temperatures rise rapidly depending on the degree of insulation. These electrical devices are sometimes confused with other heating devices such as steam lines where the temperature in relation to the pressure is static throughout the system and will not increase no matter how heavily insulated they are.

Some serious fires were caused from baseboard electric heaters which are in widespread use for home heating here on the West Coast. Under normal operation these heaters do not rise above 175 degrees F on any of the external parts, and many people install them with the understanding that they are completely safe under any and all conditions. These fires occurred when blankets rolled off the bed on the heater, or rugs were pushed against the heater air slot preventing the normal circulation of air; and flaming combustion broke out in from 2 to 3 hours in some cases. We are hopeful that a thermal control of some type to prevent this type of overheating will be required. The greatest danger lies in that they are so safe in normal operation the potential hazard when covered or insulated is not recognized. Enclosed is a photograph of one of these heaters which recently caused a serious fire in a bedroom when a blanket fell alongside the heater.

Other electrical devices which depend primarily on thermal controls to stay within a safe heat range are subject to mechanical failure; and we recently had two graphic examples of this where the thermal control failed on 1100 watt electric steam irons with aluminum sole plates. They were both standing on end and when the failure occurred the temperature rapidly rose to

(*Continued on page 26*)



Wooden mopboard behind this heater was baked and carbonized completely through.

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HIGHLIGHTS — 33rd FDIC

THE 33rd Fire Department Instructors' Conference in Memphis, Tennessee, attracted the largest attendance in the history of the Conference. More than 3,000 fire chiefs, instructors and other members of paid, call and volunteer fire departments, industrial and governmental fire brigades gathered in the Memphis Auditorium for the four-day meeting, February 28–March 3. Outdoor demonstrations on Tuesday and Wednesday and a demonstration in the Auditorium on Thursday evening supplemented more than 40 speakers and panel discussions.

The FDIC is sponsored each year by the Memphis Fire Department and the Western Actuarial Bureau of Chicago with the cooperation of Memphis civic organizations. Chief Edward A. Hamilton of Memphis and Emmett T. Cox, director of the WAB's Fire Prevention Department are co-chairmen. As in previous years, Memphis fire fighters served luncheon each day to the entire Conference attendance and also provided transportation for Conference guests.

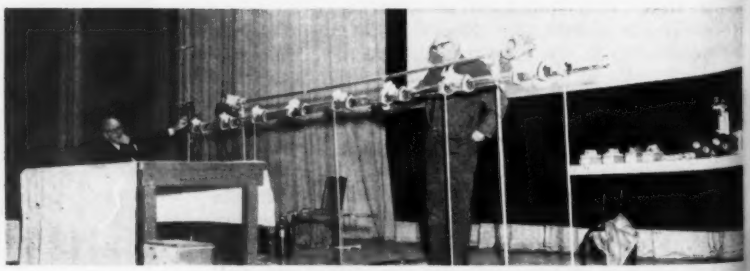
Individual speakers the first day included W. Fred Heisler, Consultant, Fireman Training, Stillwater, Oklahoma, who gave the keynote address. He was followed by Norman H. Davis, Jr., of Underwriters' Laboratories, Inc., Chicago, who covered the latest developments in portable fire extinguishers as well as the testing program used by UL in listing extinguishers. A talk by Sister Mary Roberta, St. Margaret's Mercy Hospital, Fredonia, Kansas, stressed the importance of training hospital personnel for fire prevention, fire emergencies and evacuation plan. Final item of the morning was a discussion of the O.C.D.M. Seminars by Chief Henry G. Thomas, Hartford, Connecticut, now a consultant for the National Board of Fire Underwriters, N. Y.

In the afternoon, Dr. Leonard C. Silvern, Hughes Aircraft Company, Los Angeles, California, showed how a "teaching machine" could be used for firemanship training. G. E. Ekstrand, First Assistant State Fire Marshal of Nebraska, discussed school fire inspection programs which have taken place since the tragic school fire in Chicago.

After this, the audience moved outdoors for a series of demonstrations, some of which are shown on these pages.

On Wednesday morning Chief R. C. Malmquist, of Minneapolis, Minnesota, showed how reflective tape could be used on fire fighters' clothing and equipment to bring greater safety in fire response and in fireground operations. He was followed by Chief Edward A. Ham-

Claude A. Armour, Vice Mayor and Commissioner of Fire and Police, Memphis, extends greetings to FDIC guests during opening morning session.



A spectacular series of demonstrations of flame propagation was featured on Thursday evening by G. M. Kintz and Harold F. Browne, U.S. Dept. of Interior.

Also demonstrated was a water curtain device shown here in use on the ground and on ladder pipe of Memphis' elevating platform apparatus.

ilton, of Memphis, who told how hospitals were evacuated during the Memphis ball park fire last year, a fire which advanced rapidly on a 300-foot front and dangerously threatened the nearby Baptist Hospital.

Miles E. Woodworth, of the NFPA Staff, then discussed the numerous fire protection and fire control problems concerning the storage of flammable liquids. Following this, John J. Ahern, Director of Security, General Motors Corporation, Detroit, Michigan, and Walter H. Konn, also of General Motors, discussed the handling of hazardous materials, including radioactive materials, in industry.

The afternoon demonstration on Wednesday involved the handling and extinguishment of particles of high explosives which would be present if aircraft carrying atomic weapons crashed and became involved by fire.

Thursday's morning session included a talk by Dr. Carl A. Moyer,

(*Continued on page 24*)

Chief Edward A. Hamilton, Memphis Fire Department, host chief of the FDIC.

Emmett T. Cox, Western Actuarial Bureau, FDIC Conference Chairman.

Out with the Smoke In with the Crew

Case Study J-652*

And down goes the damage with a Super Vac Smoke Ejector

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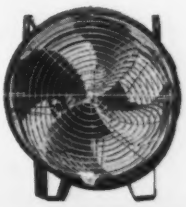

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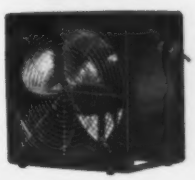

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Highlights — 33rd FDIC

(*Continued from page 23*)

of St. Louis, Missouri, on the traumatic effect of burns and an illustrated talk by Major Carroll E. Shaw, Deputy State Fire Marshal, Hartford, Connecticut, covering the identification of hazardous cargoes transported by truck on North American highways. Warren E. Uecker, Fire Protection Specialist, Rock Island Arsenal, Rock Island, Illinois, then gave a talk on how a fire department can develop an effective year-round fire prevention program and improve its value to the community or industry which it serves. Keith Royer, Director, Firemanship Training, Iowa State University, Ames, Iowa, then showed how some of the latest techniques in making film slides and using projection equipment can stimulate a firemen's training program.

In the afternoon Dale K. Auck, Federation of Mutual Fire Insurance Companies, Chicago, told how fire inspectors should be alert to new methods of processing materials and new types of structures which may drastically alter the fire loss potential in modern building. Other talks were by Wilson Baker, University of Alabama; Hubert Walker, American LaFrance Corporation, who discussed turbine engines for fire apparatus; Captain Martin C. McMahon, Baltimore, Maryland, who discussed closed chest cardiac massage; and Chief O. E. Hirst of Galena, Illinois, who told how a victim had been revived by this new method of resuscitation.

Shown on the Mississippi River was a new jet-propelled fire and rescue boat.

Friday morning began with a panel discussion by Training Officers Ralph L. Ellenwood, Fort Wayne, Indiana; Paul A. McElheney, Hutchinson, Kansas; R. L. Powell, Jr., Greensboro, North Carolina, and Thomas L. Godfrey, St. Louis, Missouri. Wayne C. Jenkins, Chief, Fire Prevention Division of the Ohio State Fire Marshal's Office, then gave an illustrated address on home fire drills. George E. Morrison, of the United States Chamber of Commerce, Washington, D. C., then discussed the Fire Safety Contest conducted by that organization. Boyd A. Hartley, of the National Board of Fire Underwriters, gave an illustrated talk on the tragic collision of two aircraft over Brooklyn, New York, last December.

The final item on the morning program was a discussion of fire protection for missile and rocket installations by fire chiefs and consultants who work at these bases.

In the afternoon, Guy Isenberg, of Tennessee Eastman Corporation, discussed the explosion last year at the Kingsport plant. This was followed by closing remarks by Chairman Cox and Chief Hamilton, drawings for attendance prizes and the FDIC Follies for 1961.

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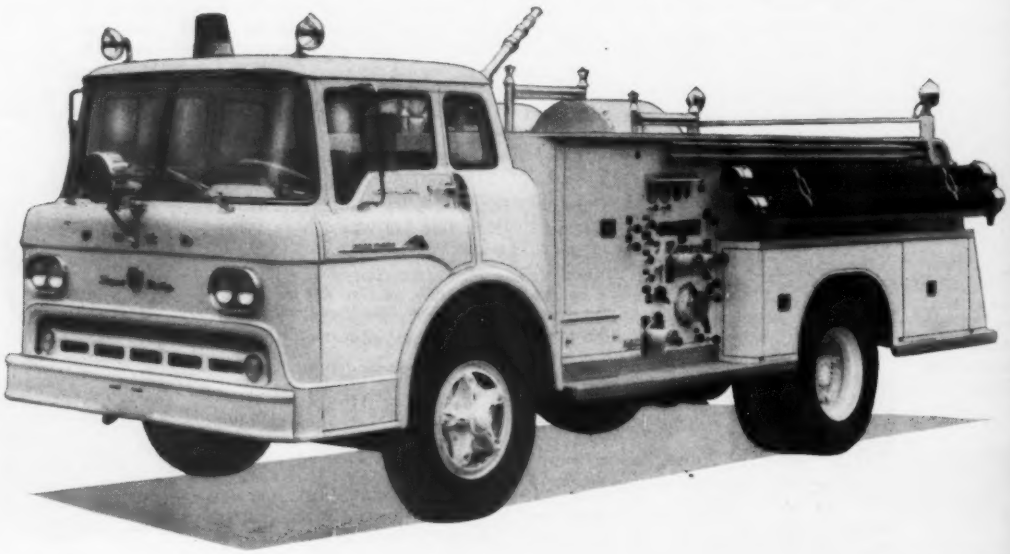

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A NATIONWIDE ORGANIZATION

More Information on Fire Causes

(*Continued from page 21*)

the melting point of aluminum, and the molten aluminum flowing onto the combustible ironing board covers ignited them immediately. The first iron was operating for a period of only 15 minutes. The second iron had been on for between 2 and 3 hours, and apparently the failure occurred just prior to the discovery of the fire. I am enclosing two photographs of these irons since they seem to be rather unusual examples.

Some of the char patterns mentioned earlier which indicate a fast, intense fire (i.e., large, rolling blisters or alligatoring with sharp lines between charred and uncharred wood) are usually found in all fires where the fire has extended much beyond the point of origin, even though it was caused from a very slow, low-temperature heat source. This occurs because the incipient or smoldering stage of combustion may bake or smolder for several hours at the point of origin and then, after breaking into flaming combustion, will move at the same speed and intensity as an accelerated or fast-starting fire. On the other hand, in a fast-starting or accelerated fire you would not normally find any flat, baked-out and deeply carbonized areas.

This is evident in the photo of the baseboard electric heater, where the mopboard behind the heater was carbonized completely through from a slow-baking heat and yet on both sides of it, and in the rest of the room, the char on the woodwork was about ½ inch deep and indicated a very hot, fast-moving fire.

Very truly yours,
C. W. STICKNEY, *Chief Investigator*
Portland, Oregon, Fire Department

German Book on Water

FIRE department members who can read a text in German will find useful a new book on the technology of water for fire extinguishment. It presents in detail information on the physical and chemical properties of water, flow of water in pipes and hose, the technology of water in straight streams and spray streams, and experiments which have been conducted on the means by which water extinguishes fire.

It is written from the point of view of how water is used in fire department practice, but does not attempt to cover in any detail some phases of the problem, such as water in the grid distribution systems of cities or water in systems for protection of industrial plants. Sprinkler systems and systems of water spray for fire protection of industrial processes are simply given brief mention. It is thorough in what is treated and an important contribution to the technical literature on fire.

The new book, titled *Wasser als Loschmittel* by Oskar Herterich (248 pages, clothbound), is the second in a Library of Fire Protection being developed by the publishers. The first book of the series, on fire technology, called to the attention of NFPA members in *Fire News*, September, 1956, and April, 1959, is now in a second edition. It is titled *Brandlehre und chemischer Brandschutz* by Ludwig Scheichl, 444 pages, clothbound.

The price of each book is 28 Deutsche marks (about $7 each). Orders for either or both should be addressed directly to the publishers: Dr. Alfred Huthig Verlag, Wilckensstrasse 3, Heidelberg, Germany. Remittances for the books can be made by international money order.

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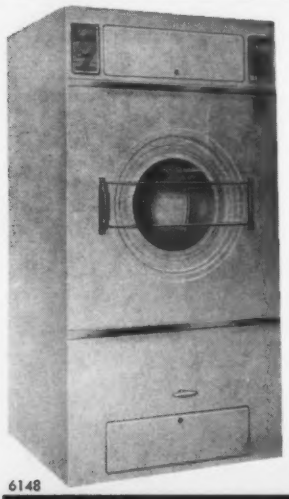

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WASHERS • EXTRACTORS • DRYERS

New Station in Sioux City

Fire Chief John Hill and the Sioux City, Iowa, Fire Department recently activated this new station on the north side of the city near the Country Club and Crescent Park areas. Built and equipped for $100,000, the station is designed to house two engine companies and includes a dormitory, locker room, kitchen, recreation room, an office, a large basement and a hose tower. Currently, only one engine company occupies the new quarters. *(Photo by G. R. Lindblade)*

"Standard of Municipal Fire Protection"

AN INFORMATIVE publication for Canadian fire chiefs and municipal authorities has been published by the Canadian Underwriters Association, 460 St. John Street, Montreal 1, Province of Quebec, Canada. Bearing the title *Standard of Municipal Fire Protection*, it sets forth the standard requirements of good fire protection for cities and towns. The Underwriters use these standards to evaluate protection in a municipality for fire insurance rating and underwriting purposes. The book is intended to serve as a reference work for city councils, fire chiefs, water works superintendents, consulting engineers and others who plan and design facilities for municipal fire protection.

It is available free on request by such Canadian officials. The 57-page, 5¼- x 8⅝-inch paper-bound booklet can be obtained by writing to the Canadian Underwriters Association at the above address or to its regional branches and affiliated organizations.

State Fair Display

During the 1960 State Fair of Texas, the Dallas Fire Department used this attractive exhibit for passing out fire prevention materials. Designed and built by the Freeman Decorating Company, the exhibit was housed in the Varied Industries Building at the State Fairgrounds.

More for your Money...in MORYSVILLE

F-147 FIRE-RESCUE UNIT

- Heavy Duty Construction
- Diamond Plate Decks
- Double Paneled Doors with Full-Length Rod Type Hinges
- Chrome Plated Rub Rails and Hand Rails
- 100 Gal. Water Tank
- Two Full-Length Seats
- Wire Reel Compartment • Hose Reel
- Available in 48" CA to 108" CA (48" CA shown)

Custom built to carry high pressure water pump, generator, suction hose, Indian tanks, four resuscitators, six extra D tanks, etc.

MORYSVILLE Body Works INC.

813 SOUTH READING AVE., BOYERTOWN, PENNA.
DISTRIBUTORS IN PRINCIPAL CITIES

Also a complete line of compact and versatile Fire, Fire-Crash, Rescue and Emergency Units and Special Built Fire Bodies. Finest materials and workmanship, extra-rugged construction and original modern design. Compartments arranged for handy stowage of fire fighting, first aid and life saving equipment, helmets, rain gear, tools, tanks, portable pumps and generators, etc.

Write for FREE Literature

New MCA Booklet

THE Manufacturing Chemists' Association, Inc., 1825 Connecticut Avenue, N.W., Washington 9, D. C., has published a new safety guide pamphlet. Entitled *Recommended Safe Practices and Procedures — Storage and Handling of Shock and Impact Sensitive Materials*, the pamphlet covers all such materials other than those classified as explosives. It points out that only those authorized and educated in safe handling procedures should have access to these sensitive materials. Other safety precautions include: use of spark-resistant tools, direction of all operations by qualified personnel, prevention of accumulation of sensitive waste material and isolation of the processing area. Copies are available from the Manufacturing Chemists' Association for 20 cents each. Ask for Booklet SG-7.

Ansul Fire School

NINE sessions of Ansul Chemical Company's 1961 Fire School are now open for enrollment, according to Fire School Director Frank L. Hruska. The three-day sessions are scheduled from May 22 to September 18.

Employees of Ansul customers are eligible to attend the school free of charge. Sessions are held on Ansul's five-acre training ground at Marinette, Wisconsin. Most of each session is taken up with actual fire fighting, starting with small gasoline pan fires and working up to large flammable liquid pressure fires and an 800-square-foot oil pit fire. Advanced fire fighting techniques are also taught.

Classes at each session of the school are limited to 25 men. Registrations are accepted on a first come basis. Those who would like to enroll should contact their nearest Ansul representative.

Starting dates for the nine sessions of the fire school are: May 22, June 5, June 12, July 24, August 7, August 14, August 28, September 11 and September 18.

Versatile, Low-Cost Fire Protection for Town and Country

Gets to the blaze fast. Low center of gravity for faster speed, greater mobility over rough terrain. Available mounted or unmounted.

Top fire-fighting efficiency. 200 gal. per minute discharge; up to 3000 gal. tank. Self-priming pump, PTO operated for steady stream delivery. Water can be discharged while tanker is moving. Suction hose and strainer allows replenishing water supply from any available source.

All extra equipment, no extra frills. Hand tools, extinguishers, fog nozzles, ladders included. The Baughman Fire Tanker is kept low in weight, low in cost — without sacrificing capability.

- One piece rust-proof welded tank, removable top for easy cleaning.
- Exclusive Baughman jack system relieves weight at rear of Tanker, permits more water to be held while parked.
- Safe semi-enclosed rear riding platform.
- Rotating beacon light, spot lights, siren.

Better service through better engineering.

Service and parts from 200 dealer branches.

Write for illustrated Bulletin A-429. *Demonstrations Available*

BAUGHMAN MANUFACTURING COMPANY, INC.

317 SHIPMAN ROAD • JERSEYVILLE, ILLINOIS

6044

Peg-Board for Tools

In Benton Harbor, Michigan, the fire department has used a "Peg-Board" for carrying tools in the storage compartment of this pumper. Chief Maurice Shepherdson, at left, and Fireman James Woodley are shown examining the installation.

Change in Film Listing

A NUMBER of fire departments are using the *Fire Control Film List* published by FIREMEN magazine two years ago. On page 27 of this booklet, in the films listed for the general public, is one entitled "Kerosene The Killer." This was produced by the Fire Prevention Bureau of the Memphis, Tennessee, Fire Department.

Chief of Training C. L. Scott, of Memphis, sends word that available prints of this film have now become rather worn because of extensive use. Because of this the film is being withdrawn and will not be available for use by other fire departments or organizations.

"A chairman of a meeting is like the official at a bullfight whose function is to open the gates and let the bull in." — Dewey F. Barich.

Leo C. Driscoll

LEO C. DRISCOLL, retired chief of the Boston, Massachusetts, Fire Department, died early in March. A U.S. Navy veteran of World Wars I and II, Chief Driscoll became a member of the department in 1927 and was assigned to Fireboat Engine 47. Ten years later he was appointed to lieutenant and in 1942 he was appointed to captain. He was promoted to district chief in 1944, to deputy chief in 1950 and to assistant chief in 1955. A year later he became chief of department, retiring from that post in 1959.

He was a member of the NFPA Committee on Firemen's Training, the International Association of Fire Chiefs, the New England Association of Fire Chiefs, the Fire Chiefs' Club of Massachusetts and other organizations.

Norton T. Ames

NORTON T. AMES, of Oregon, Wisconsin, who was known throughout that state and in many other areas for his devotion to the fire service, died at his home on February 24. For many years he was a member of the Oregon Volunteer Fire Department. He also served as president of the Wisconsin Council of Firemen's Associations and as a director of the Southern Wisconsin-Northern Illinois Firemen's Association. He made a significant contribution to the development of Wisconsin legislation to support a firemanship training program. He operated insurance agencies in Oregon and Madison and was vice president and director of the Bank of Oregon, Wisconsin. For many years he was an active member of the NFPA Committees on Rural Fire Protection and Fire Service Training and was chairman of the subcommittee on Rural Fire Departments. In that capacity he coordinated the preparation of a book on rural fire fighting which will soon be published.

Disney's Dalmations and Sparky

THE new Disney film, "One Hundred and One Dalmations," has started what promises to be a long and successful run in theatres all over the country.

Here is a "natural" for a tie-in of Sparky's fire safety messages with the showing of this popular film in your community.

In Portland, Maine, District Chief Haswell M. Bruns arranged with his local theatre to run the 1-minute Sparky film with each showing of the picture. Also arranged was a free ticket to the movie for the first 1,000 boys and girls sending in letters telling what they were doing to prevent fires.

Portland youngsters responded so enthusiastically that an "All Out" had to be sounded when letters received numbered way over 1,000.

In Boston, the Chamber of Commerce's Fire Prevention Committee also arranged for use of the Sparky film with each showing of the Disney picture.

Contact your local theatre manager and talk with him about similar promotional ideas. (The 35mm Sparky film for theatre use is available from NFPA at $9.75 per print.)

you can always count on
E&J dependability

THE ICR MODEL
RESUSCITATOR • INHALATOR • ASPIRATOR

Simplified operation is assured by the ICR control center. It has the *exclusive* E&J Precision Flow Control Valve, permitting *precise oxygen flow* for difficult cases. The lower selector switch sets the unit for resuscitation, inhalation, or aspiration. Pre-set pressures and automatic action assure safe, continuous operation for all emergency needs.

• *See the rugged and efficient ICR Model in action. Ask your E&J dealer for a demonstration, or write Dept. F-4 for bulletin No. 2434-BB.*

OHIO Ohio Chemical

Ohio Chemical & Surgical Equipment Co., Madison, Wis.; Ohio Chemical Pacific Co., Berkeley, Calif.; Ohio Chemical Canada Limited, Toronto, Canada; Airco Company International, New York City (Divisions or Subsidiaries of Air Reduction Company, Inc.)

FIRE SERVICE MEETINGS

APRIL

California:

APRIL 20: Redwood Empire Firemen's Association, regular meeting, Napa. Contact W. H. Lane, secretary, 74 Vendola Drive, San Rafael.

APRIL 21: Marin County Association of Fire Departments, regular meeting, Mill Valley. Contact W. H. Lane, above.

Delaware:

APRIL 19: Kent County Volunteer Firemen's Association, regular meeting, Little Creek. Contact Paul B. Smith, secretary, Marydel.

APRIL 22: Delaware Fire Chiefs' Association, semi-annual meeting, Camden-Wyoming Fire Company, Camden. Contact Alan Thomas, president, 81 E. Cleveland Ave., Newark.

APRIL 25: Sussex County Volunteer Firemen's Association, regular meeting, Laurel Fire Department. Contact W. J. Quillen, secretary, Ocean View.

Illinois:

APRIL 20–22: Illinois Fire Chiefs' Association, Annual Convention, Hotel Lincoln-Douglas, Quincy. Contact Lester P. Manace, secretary, Peoria Fire Department.

Maryland:

APRIL 16: Maryland State Firemen's Association, Spring meeting, La Vale, Allegany County. Contact Floyd B. Heimer, secretary, Box 46, Branchville.

Missouri:

APRIL 21: West Central Missouri Firemen's Association, Inc., regular meeting, Harrisonville Fire Station. Contact Harvey L. Dunn, president, Harrisonville.

APRIL 28–30: Seventh Annual Fire Fighters' Association of Missouri Convention, Washington. Contact Chief Kenneth Wilson, Washington.

New Jersey:

APRIL 18: New Jersey State Firemen's Advisory Council, annual meeting, Fire Headquarters, Fort Dix. Contact Luther S. Clark, Jr., secretary, Wood Road, Morristown.

APRIL 20: Gloucester County Firemen's Association, regular meeting, Westville Grove, Tacoma. Contact W. H. Mattson, secretary, 29 Home Avenue, Gibbstown.

New York:

APRIL 17: Chenango County Firemen's Association, regular meeting, Sherburne. Contact C. J. Gardner, Jr., secretary, Mount Upton.

APRIL 17: Orleans County Volunteer Firemen's Association, quarterly meeting, Clarendon. Contact J. Wallace Eggleston, secretary, 109 Beaver Street, Albion.

APRIL 18: Dutchess County Volunteer Firemen's Association, La Grange Volunteer Fire Company No. 2. Contact Albert Belle Isle, secretary, Box 725, Glenham.

APRIL 20: Fire Chiefs' Council of Suffolk County, regular meeting. Contact Chief Harold Hochheiser, secretary, Riverhead, L. I.

APRIL 20: Hudson-Mohawk Volunteer Firemen's Association, Inc., regular meeting. Contact W. J. Hopmeier, secretary, R.D. 5, Box 202, Schenectady.

APRIL 25: Suffolk County Volunteer Firemen's Association, quarterly meeting, Suffolk County Training Center, Yaphank, L. I. Contact Harold Hoek, secretary, 141 Division Avenue, W. Sayville.

APRIL 30: Monroe County Volunteer Firemen's Association, annual meeting, 2:30 P.M. Community House, Webster. Contact Nathan C. Morrell, secretary, 241 Buckman Road, Rochester.

Ohio:

APRIL 24: Western Hamilton County Fire Protective Association, quarterly meeting, North Bend Fire Department, North Bend. Contact Robert Oehler, president, 3628 White Oak Drive, Cincinnati 39.

APRIL 26: Central Western Firemen's Association, regular meeting, Spencerville. Contact Jerry Wagner, secretary, 1007 N. Barron Street, Eaton.

APRIL 27: Stark County Firemen's Association, Inc., regular meeting, East Canton. Contact Gene Kay, secretary, 2036 29th Street, N.E., Canton 5.

Oregon:

APRIL 17: Clackamas County Firemen's Association, regular meeting. Contact Walter Wickline, secretary, 2137 S.E. 55th Avenue, West Linn.

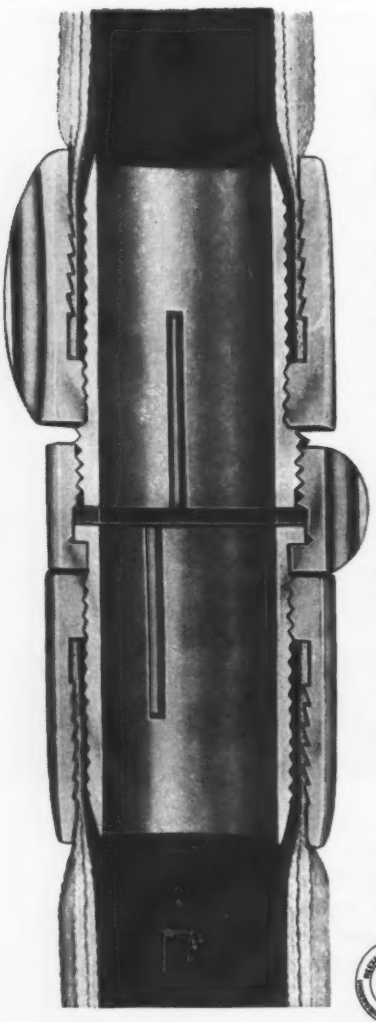
APRIL 19: Central Willamette Fire Fighters' Association, regular meeting, Stayton. Contact E. J. Bell, secretary, Stayton.

APRIL 28: Polk-Yamhill Firemen's Association, regular meeting, Yamhill. Contact Glenn Wick, secretary, 209 Hayter Street, Dallas.

Pennsylvania:

APRIL 16: Board of Control of Central District Volunteer Firemen's Association, annual Spring meeting, Phoenix Volunteer Fire Company Hall, Hollidaysburg. Contact Donald P. Lingafelt, 315 Murphy Street, Hollidaysburg.

APRIL 18: Perry County Firemen's Association, regular meeting, New Buffalo. Con-



Put BAR-WAY in your "specs"

THE REUSABLE HIGH PRESSURE COUPLING THAT GIVES A QUICK, SURE CONNECTION FOR ALL TYPES OF JACKETED HOSE.

The simplified streamlined design of this precision coupling, which is basically the same as that of your booster hose, guarantees full flow, full pressure and ease of handling under all conditions. Fast emergency hose repairs can also be made in the field if you specify Bar-Way for original application.

Demand Bar-Way reusable couplings on your jacketed hose and watch your efficiency go up and the cost go down.

1½" and 2½" Conventional Wing Lug in production. All other standard sizes and lug styles available. Special engineering applications on request.

TESTED for 1400 lbs. pressure and 2400 lbs. pull under full pressure.

BAR-WAY® BAR-WAY MFG. CO., STAMFORD, CONN.

tact Frank L. Fry, secretary, New Bloomfield.

Rhode Island:

APRIL 26: Pawtuxet Valley Firemen's League, regular meeting, Hill Farm Road Volunteer Fire Company. Contact E. F. Fiske, secretary, 34 Pleasant Street, West Warwick.

Vermont:

APRIL 16: Vermont State Firefighters' Association, executive meeting, Rutland. Contact H. C. Dailey, secretary, Manchester.

Wisconsin:

APRIL 20: Eastern Wisconsin Firemen's Association, quarterly meeting, Fond du Lac. Contact Ardell Braun, secretary, 1438 N. 43rd Street, Sheboygan.

MAY

Delaware:

MAY 7: Delaware Volunteer Firemen's Association, Annual Memorial Service, Firemen's Monument, City Plaza, Dover, 2:00 P.M. Contact Dr. T. C. Mulligan, chairman, State Association Chaplain, Georgetown.

MAY 11: New Castle County Volunteer Firemen's Association, regular meeting, Brandywine Hundred Fire Co., Bellefonte. Contact Ed Hawthorne, secretary, Box 175, St. Georges.

Florida:

MAY 4–6: Florida State Firemen's Association, annual convention, Delray Beach. Contact E. J. Langley, secretary, P.O. Drawer 428, Chattahoochee.

MAY 11: Lake County Firemen's Association, regular meeting, Groveland. Contact John Jackson, secretary, Umatilla.

Kansas:

MAY 4–6: Kansas State Firemen's Association, Inc., annual convention, Baker Hotel, Hutchinson. Contact Elmer E. Mehl, secretary, 544 So. Hillside, Wichita 11.

New York:

MAY 5: Broome County Firemen's Association, Inc., regular meeting, Maine. Contact Glenn Fuller, secretary, Box 79, Port Crane.

MAY 7: Erie County Volunteer Firemen's Association, quarterly meeting, Armor Fire Hall, Hamburg. Contact C. S. Herbold, secretary, 481 Harris Hill Road, Bowmansville.

MAY 10: Tompkins County Firemen's Association, annual dinner, Ithaca. Contact R. J. Albertson, secretary, Brooktondale.

MAY 10: Steuben County Firemen's Association, Inc., regular meeting, Prattsburg. Contact T. L. Burbridge, secretary, R No. 1, Hornell.

MAY 11: Volunteer Firemen's Association of Madison County, regular meeting, Banquet. Contact Donald Burke, secretary, 51 Fenner Street, Canenovia.

MAY 11: Tioga County Firemen's Association, Inc., regular meeting, Nichols. Contact R. Franklin Ogden, secretary, Box 411, Newark Valley.

MAY 11: Mid-Hudson-Harlem Valley Fire Chiefs' Association, Inc., regular meeting, Rhinebeck Fire Department. Contact Dick Kennedy, secretary, Box 18, Glenham.

MAY 12: Rockland County Volunteer Firemen's Association, Inc., regular meeting, Stony Point. Contact Merle Blauvelt, secretary, 140 Fifth Avenue, Nyack 8.

Ohio:

MAY 3: Greene County Firemen's Association, regular meeting, Bellbrook. Contact N. K. Fernandez, secretary, 64 W. Franklin Street, Bellbrook.

MAY 4: Tri-County Volunteer Firemen's Association, regular meeting, Harrisville. Contact Charles W. Luyster, secretary, Piedmont.

MAY 9: Summit County Firemen's Association, regular meeting, Twinsburg. Contact Harry Harris, secretary, 998 Kubler Street, Akron 12.

Oregon:

MAY 10: Marion County Firemen's Association, regular meeting, Salem. Contact Allan Foster, secretary, 506 McClaine Street, Silverton.

Pennsylvania:

MAY 5: Fayette County Firemen's Association, regular meeting, 8:00 P.M., Springfield Twp., Mill Run. Contact F. R. Gustafson, secretary, P.O. Box 126, Connellsville.

MAY 13: Allegheny County Volunteer Firemen's Association, regular meeting, Thad Stevens Fire Hall, Penn Hills. For details contact A. H. Leck, recording secretary, P.O. Box 106, McKees Rocks.

Rhode Island:

MAY 9: Woonasquatucket Valley Firemen's League, regular meeting, West End Hose Co., Johnston. Contact G. J. McAvoy, secretary, 12 Jackson Avenue, Johnston 9.

MAY 9: South County Fire Chiefs' & Forest Wardens' Association, regular meeting, Charlestown-Richmond Fire Department. Contact H. F. Briggs, Jr., secretary, Saunderstown.

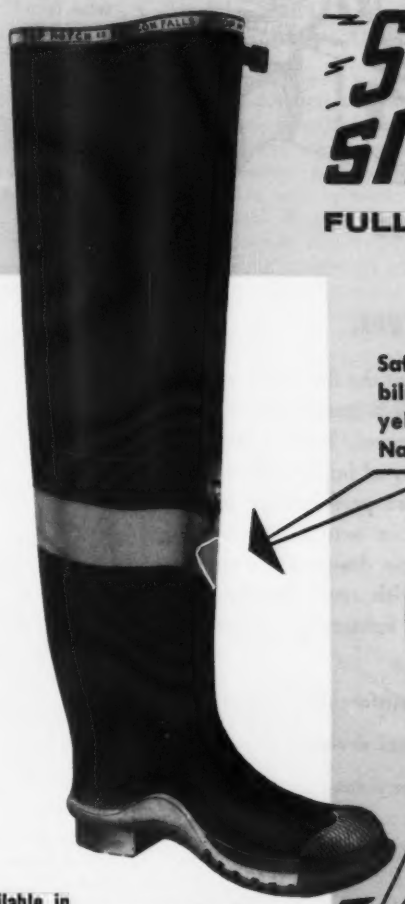
Texas:

MAY 3: Dallas County Fire Chiefs' Association, regular meeting, Farmers Branch. Contact Chief J. C. Swadley, Jr., 321 W. Main Street, Grand Prairie.

TOP NOTCH

SUPER SIREN

FULL PROTECTION FOR FIREMEN



Safety Stripe of high visibility yellow, the authentic yellow approved by the National Safety Council.

Built-in, puncture-resistant insole, tested to withstand 250 lbs. of pressure.

Plus more than 20 outstanding features that have earned Siren Boots nationwide recognition.

available in "SHORT" or "STORM KING" heights

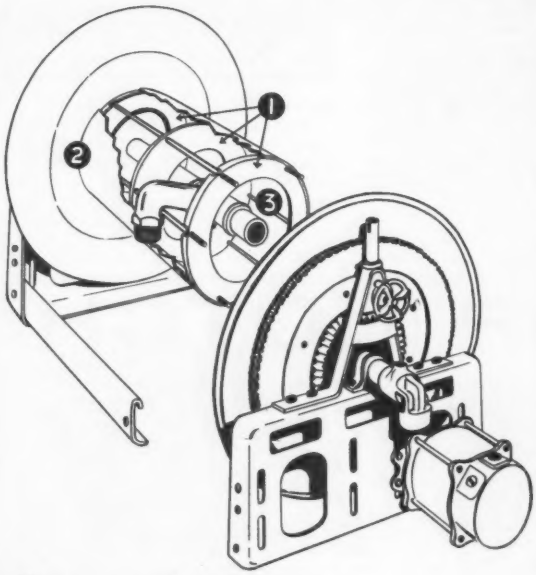
CONSTRUCTED FOR FIREMEN
TESTED BY FIREMEN
PREFERRED BY FIREMEN

Write for a pamphlet illustrating our complete line of Top Notch Siren Boots

TOP NOTCH SIREN BEACON FALLS CONN.

exclusive products of
BEACON FALLS RUBBER FOOTWEAR · BEACON FALLS, CONNECTICUT

Did You Know?



Hannay reels give you built-in protection against pressure surges.

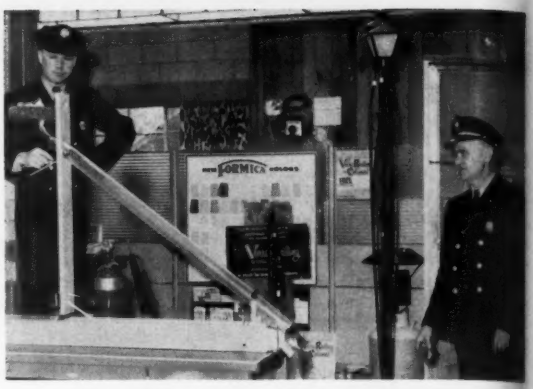
You're out of action at the fire when extreme pressure surges crush drums, spring discs or jam gears on the hose reel. To give you built-in protection against reel failure, Hannay engineers make pressure performance tests in the laboratory and in actual fire fighting service. You get these design and construction features only with reels designed and built by active fire fighters . . . reels by Hannay.

1. **Cast Tenzalloy reinforcing discs.**
2. **Welded heavy steel drum.**
3. **Tie rods with pipe sleeve spacers.**

NEW guide to hose reel selection and data sheet on reels for CRL hose now available. Send for your copy today.

REELS BY HANNAY

CLIFFORD B. HANNAY & SON, INC.
WESTERLO, NEW YORK

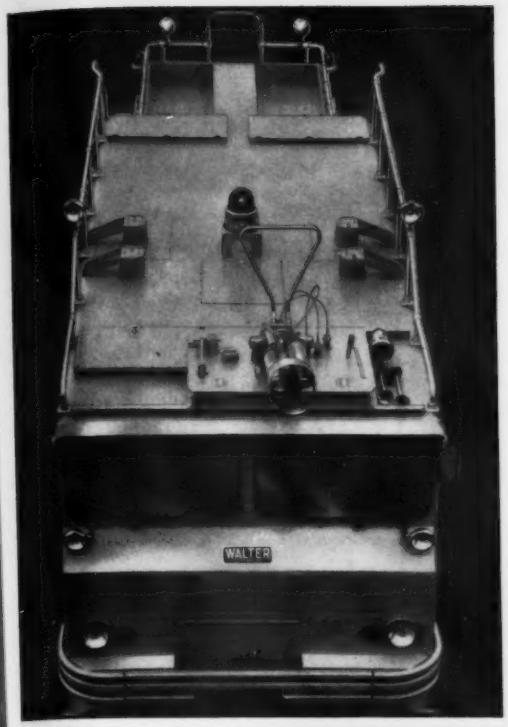


Fire Prevention Demonstration

RECENTLY the Bloomington, Indiana, Fire Department has been training fire brigades of industrial plants in its area of protection. The department, headed by Chief Bernard Glover, provides men who have received fire service training at Purdue University to give instruction in fire prevention, inspection and fire fighting methods for plant fire brigade personnel. In the photo above, fire fighters William Stone and Roland Gwin are demonstrating the hazards of flammable liquids with equipment manufactured by members of the department. This is similar to the equipment described in the January and February 1960 issues of FIREMEN magazine which included articles on how to construct such equipment for fire prevention demonstrations. The articles have been combined and are available in reprint form for 50¢ each from the NFPA Publications Department.

Aerial Ladder Trucks for Los Angeles County

Los Angeles County Fire Chief Keith E. Klinger and Deputy Chief John W. Duncan recently inspected three new Seagrave 85-foot aerial ladder trucks which were placed in service by the Department. Truck 8 will serve the unincorporated area of West Hollywood; Truck 20, the City of Norwalk; and Truck 42, the City of Rosemead. Each truck is equipped with a 310 HP engine; a 4-section steel, hydraulically operated, 85-foot aerial ladder and various other ladders ranging from a 10-foot folding to a 50-foot extension. Miscellaneous equipment includes ladder pipes, cellar pipes, axes, salvage covers, life net, life gun, and other necessary pieces of equipment. Additional features include power steering, air brakes and a ladder communications system. In common with all other County fire equipment, it has a 3-way radio to facilitate speed of response and aid in economical operation.



SPEED RESCUES AT CRASH FIRES!

Step up your department's life-saving power . . . equip with Rockwood FOAM systems, nozzles, FOAM liquid.

Rockwood equipment, selected for fast, flame-smothering rescue action at airport crash fires, brings the same powerful protection to municipalities, chemical plants, refineries and all industry. Rockwood makes the most complete line of turrets and nozzles, to handle solid FOAM stream, FogFOAM, WaterFOG and solid water stream. Make sure your own trucks are equipped for maximum safety of lives and property! For details on the complete Rockwood line write to Rockwood Sprinkler Company, Portable Fire Protection Department, 430 Harlow St., Worcester 5, Massachusetts.

ROCKWOOD SPRINKLER COMPANY

A Division of The Gamewell Company • A Subsidiary of E. W. Bliss Company

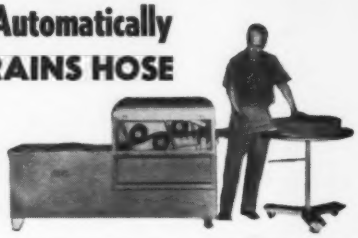
Engineers Water . . . to cut fire losses

Distributors in all principal cities

One of the largest, most effective Aircraft Rescue and Fire Fighting Vehicles is now in service at the Washington National Airport. Basic truck design is by the Walter Motor Truck Company. Fire fighting equipment specially designed by Rockwood includes: (1) 8000 GPM turret nozzle with hydraulic power control from within the cab or direct manual control from cab roof; (2) a ground sweep nozzle beneath the front bumper, which spreads a FOAM blanket to protect truck and crew; (3) nozzles for two handlines, discharging 600 GPM; (4) a FOAM proportioner for the pumping system. With Rockwood equipment, Rockwood FOAM liquid makes a powerful fire fighting combination.

Roto-Jet Hose Washer Automatically
WASHES – RINSES – DRAINS HOSE

ROTO-JET Washes, Rinses, Drains hose thoroughly and quickly. Hose is self-propelled. Simple one-man operation. With or without detergents, ashes, glass and sludge are automatically scrubbed out and flushed away. Lengthens hose life. Foot-Pedal Operation.



CIRCUL-AIR
FIRE HOSE DRYER

The patented, electrically operated Circul-Air hose dryer circulates pre-warmed fresh air through loosely coiled hose at the rate of 5 to 6 air changes per minute. No other drying method is so fast — so economical — so easy to use. The preferred dryer in over 6,000 leading Fire Departments.

ACCEPTED — APPROVED
RECOMMENDED

Approved by Underwriters' Laboratories . . . and Canadian Standards Association. Recommended by all leading fire hose manufacturers.

THE CIRCUL-AIR CORPORATION 565 EAST MILWAUKEE DETROIT 2, MICHIGAN

SUPER-SAFETY HOSE CUTTER
Now you can cut hose straight every time with
Bell & Pihl *"Straight Edge"* Hose Cutter

For that straight edge you need –

For perfect alignment with seat of coupling –

For a leak-proof hose connection every time –

For complete accuracy and safety with speed –

BELL & PIHL "Straight Edge" HOSE CUTTER is the answer.

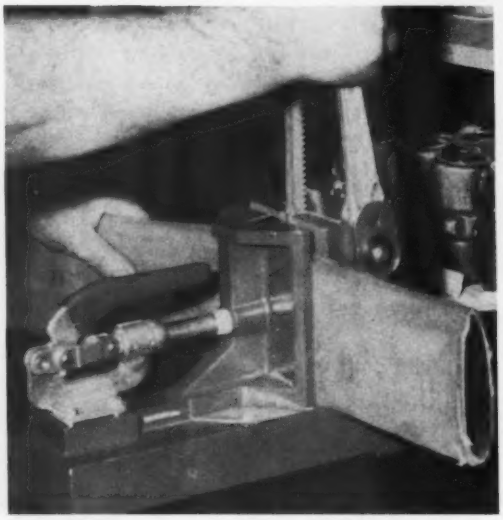


Photo by Boston Fire Dept.

Cut your hose the new, modern, *SAFE* way!

WRITE TODAY TO:

BELL & PIHL CO. 182 BROADWAY, ARLINGTON 74, MASS.

New Deputy Fire Marshal

JOHN TURNBULL, former Executive Officer of the Fire Services Division of the Fire Marshal's Office, Ontario, has been appointed Deputy Fire Marshal. He succeeds Martin Hurst, who was appointed Fire Marshal last October.

Born and educated in Toronto, Turnbull joined that city's fire department in 1940, serving as a fire fighter. Twelve years later he became an instructor with the Fire Services Division, advancing to Executive Officer in 1957. Well known in the fire service, Turnbull is Secretary of the Emergency Measures Organization of Ontario.

Baby-sitter Course

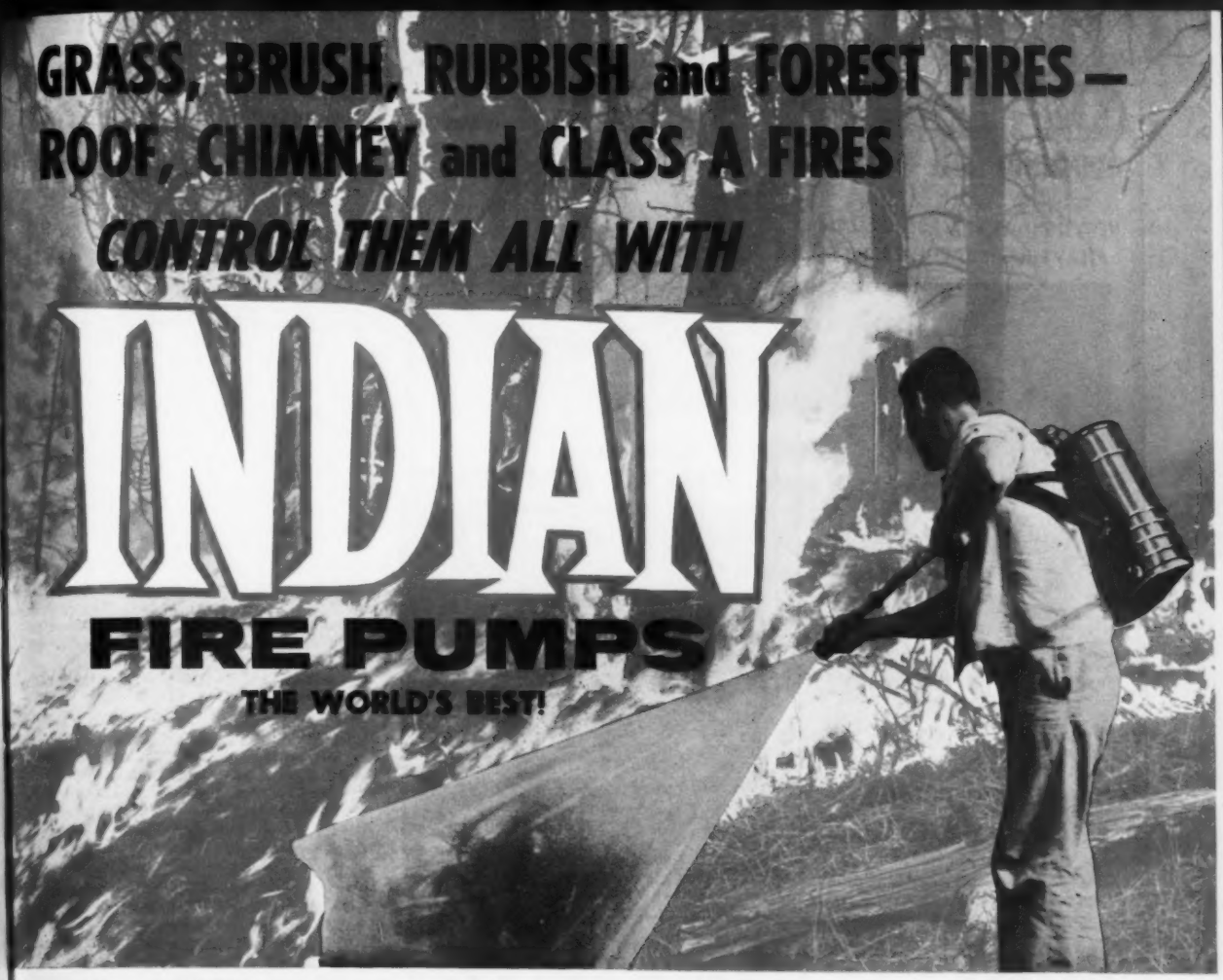
IN THE past few years, a great many fire departments have developed special courses for training girls and boys as baby sitters well informed on fire safety. Fire departments which have tried this have been surprised at the good attendance of youngsters at the training classes.

Typical was the experience of the Cheshire Fire Department in Cheshire, Connecticut, which this year started a baby-sitter training course for the first time. James E. Doherty, Chairman of the Fire Prevention Committee of that department, reports that the first course was attended by 46 youngsters. The special training was received with such enthusiasm that the department is planning to expand the course in the next session, scheduled for the spring of 1961. The new course will include instruction by doctors, nurses, police, and Red Cross representatives as well as the basic fire department training.

". . . And where else could you get such instant fire protection?"

GRASS, BRUSH, RUBBISH and FOREST FIRES—
ROOF, CHIMNEY and CLASS A FIRES
CONTROL THEM ALL WITH

INDIAN
FIRE PUMPS
THE WORLD'S BEST!



For over 30 years INDIANS have been putting out small fires before they grow into big ones. Today's models have been improved and it is a pleasure to operate them. Fire fighters call the INDIAN "a one-man fire department" and tell us "they are worth their weight in gold."

No. 90 sliding pump type shown above. Available in Armco zinc grip steel, solid brass or chrome tanks.

No. 90 INDIAN FIRE PUMP
(Sliding Pump Type)

Send for circular on our new **No. 90 FIBER-GLASS** tank model. Light weight. Will not rust or corrode. Brass pump.

No. 80 INDIAN FIRE PUMP
(Lever Type Pump and Handle)

Continuous high pressure. Pump throws strong stream or nozzle adjusts for spray or fog mist. Sturdily built to give many years of service.

All models of INDIAN FIRE PUMPS are approved by Factory Mutual.

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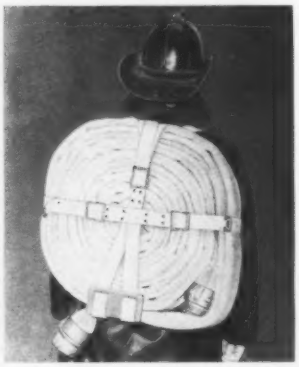

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Firemen's Training in the Months Ahead

Alabama: A three-day Fire Prevention Conference will be held in August, and an Arson Investigation Conference is scheduled for October 30–November 3. Write W. L. Rickard, P. O. Box 2847, University.

Arizona: The 9th Annual Arizona Fire Training School will be held at Phoenix College, Phoenix, October 19–21. Contact Assistant Chief Jake Siken, director, Phoenix Fire Department, 49 South First Street, Phoenix 4.

Arkansas: An Instructors' Conference will be held at the State Capitol, July 17-21. Two-week regional training schools will be conducted in 17 regions from March 20-November 30. For details write W. A. Turner, Education Building, State Capitol, Little Rock.

California: A Fire Training Officers' Workshop is scheduled for May 15–19 in Fresno. An Arson and Fire Investigation Seminar will be held June 12–16 at the University of California, Los Angeles, and a Fire Prevention Seminar is planned for July 17–21 at the University of California in Berkeley. For details write Thomas S. Ward, 721 Capitol Avenue, Sacramento 14.

Colorado: The Colorado State Firemen's Fire School and Tournament will be held June 21–24 in Salida. Contact E. W. Crawford, Head, Firemanship Training, Department of Education, 503 State Office Building, Denver 2.

Connecticut: The Seventh Annual Connecticut Fire Officers' Conference is scheduled for April 18–20 at the University of Connecticut.

The Connecticut State Fire College will be held June 5–9 at New Haven Fire Department training ground. For details, write Roy W. Adams, Director, Vocational Training Field Service, Connecticut State Department of Education, 490 Capitol Avenue, Hartford 15.

Delaware: The 13th Annual State Short Course will be held April 22–23 and April 29–30 at the Camden-Wyoming Fire Co. Write Emanuel J. Harkins, 1909 Newport Gap Pike, Cranston Heights, Wilmington.

Florida: Resident training classes will be conducted at Florida State Fire College each week in September, and October 2–6. Other special classes and conferences to be held at the College include: Heating and Air Conditioning, June 5–9; Fire Pump Maintenance, June 19–23 (Seagrave Fire Pump) and June 26–30 (Hale Fire Pump); and Fire Alarm and Communication Systems, July 17–21. A Seminar in Arson Investigation and Detection will be held August 7–11 at the Cherry Plaza Hotel, Orlando. For details write W. H. Barnett, Superintendent, Florida State Fire College, P. O. Box 785, Ocala.

Illinois: The 37th Annual Illinois Fire College will be held on the campus of the University of Illinois, Urbana, June 12–15. Officers' Regional Training Schools will be conducted in Park Ridge, April 18–May 16, and Park Forest, April 19–May 17. For de-

tails write R. K. Newton, Director, Illinois Fire College, 116D Illini Hall, Champaign.

Indiana: The Indiana State Fire School will be held September 14–17 at Purdue University, Lafayette. Contact Professor Shelby Gallien, Seminar Director, Public Safety Institute, Purdue University, West Lafayette.

Iowa: Iowa State University will be the site of the Fire Department Instructors' Conference, April 18–21; the 37th Annual Iowa State Fire School, June 13–16, and the Annual Fire Department Inspectors' Short Course, August 1–4. For details write Keith Royer, Supervisor, Firemanship Training, c/o Engineering Extension, 110 Marston Hall, Iowa State University, Ames.

Kentucky: The Kentucky Fire School will be held at the University of Kentucky, June 12–14. For details write John L. Thompson, Director, 940 Starks Building, Louisville 2.

Maryland: The following short courses are scheduled at the Fire Service Extension Department, University of Maryland: Pump School Series (tentative), May 6, 7 (Waterous), May 20, 21 (Seagrave), May 27, 28 (American LaFrance), June 3, 4 (Hale), June 10, 11 (Barton-American); Hydraulics Short Course, July 10–12; Aerial Ladder Short Course, August 7–9; and 28th Annual Short Course for Firemen, September 5–8. For details write Robert C. Byrus, Box 85, College Park.

Michigan: The 6th Annual Regional Fire School sponsored by the Macomb County Firemen's Association will be held August 12 and 19 at Shadyside Park, Mt. Clemens. For information write J. Owen Erdman, Secretary, 18345 Martin Road, Roseville.

Missouri: The 25th Annual State Fire Conference will be held July 21–23. Regional conferences will include: Ozark Fire Fighters' Conference, September 17; Cass County Fire Fighters' Conference, September 24; West Central Firemen's Association Conference, October 8; and St. Charles County Conference, October 15. Write W. Bush Walden, Firemanship Training Department, Bldg. T-3, Room 100, University of Missouri, Columbia.

New Hampshire: The New Hampshire State Fire School will be held August 26, 27 at the Training Center of the Meadowood County Area Fire Department, Fitzwilliam. Contact Chief Donald Holbrook, Meadowood County Area Fire Department.

New Jersey: The Fall training session of the New Jersey State Fire College will be held two weekends in September at Sea Girt, and an Officers' Course will be conducted one weekend in December at Seaside Heights. For details write New Jersey State Safety Council, 24 Branford Place, Newark 2.

Pennsylvania: The 23rd Annual State Fire School will be held August 14–18, and a three-day course for potential fire service instructors will be held August 21–23 at Pennsylvania State Fire School. Resident 5-day classes will be conducted in cycles April 10–November 17. For details write Art Espey, Director, Pennsylvania Fire School, Box 631, Lewistown.

South Dakota: The 32nd Annual Fire School and 77th Annual Convention will be held at Sturgis, June 4–9. For details write Francis W. Pyncheon, South Dakota Firemen's Association, P.O. Box 590, Pierre.

Texas: The 32nd Annual Texas Firemen's Training School will be held July 23–28 at Texas A&M College, College Station. For details write Henry D. Smith, Texas Firemen's Training School, College Station.

Virginia: The Annual Williamsburg Fire College will be held June 23–25. For details write Elliott W. Jayne, Director, Williamsburg Fire Department.

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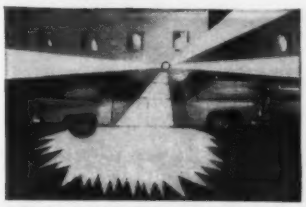

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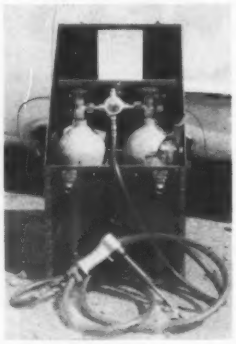

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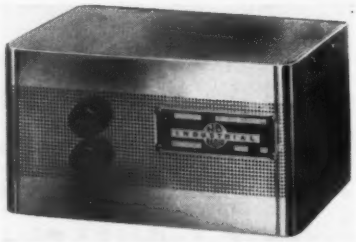
this month's *News and New Products*

New Aerial Ladder Manual

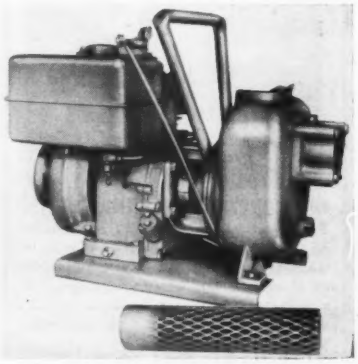
A "must" for every fire department is the new manual "Operating Fire Department Aerial Ladders," just published by NFPA. Well illustrated, it covers the many fundamentals of operation, tactical use and maintenance which must be understood by those who operate this important apparatus. One section of the book compares the operating methods of the different aerial ladders made by the major U.S. manufacturers. Chapters of the book cover a variety of subjects ranging from basic familiarization to purchase, maintenance and testing.

Other description of this important new manual can be found on the inside front cover of this issue.



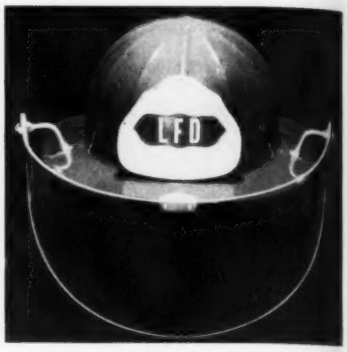
Narrow Band Monitoring Receiver

For use with mobile 2-way radio systems operating under the new FCC split channel regulations comes a new narrow band monitoring receiver by Industrial Radio Corporation, 462 N. Parkside Avenue, Chicago 44, Illinois. It is available in 12-volt and 117-volt AC models.



New Portable Pump

Universal Motor Company, 467 Universal Drive, Oshkosh, Wisconsin, announces its new "Aquamaster," a lightweight, portable dewatering pumping unit. The centrifugal pump, driven by a 3 HP Briggs and Stratton air-cooled engine, has a 2-inch discharge connection.



Face Shield for Helmet

Here is the new ⅛-inch Plexiglas face shield for all popular makes of fire helmets, offered by Plectron Corporation, Overton, Nebraska. Shield swings out of the way when not in use. Carefully designed to protect the face on the fire ground, in open apparatus and for men wearing eyeglasses.

•

There has been a large demand for the book sets "Fire Ground Library," "Fire Fighter's Manuals," and "Fire Station Reference Set," shown on the inside back cover of this issue. The last-named seems the most popular, since it combines the nine books contained in the other two sets. Each set comes in a durable container which can be placed on a desk or reference shelf. Many fire departments and individuals have purchased these for their reference libraries. . . . Also popular last year was the article "How to Identify Fire Causes" by Chief Investigator C. W. Stickney of the Portland, Oregon, Fire Department. This has now been published in a 12-page, 8½- by 11-inch illustrated reprint, available from NFPA for 50 cents per copy, with discounts for quantity purchases.

Incidentally, many fire departments have occasion to order quantities of certain technical standards, reprints from FIREMEN or the *Quarterly*, or clothbound books published by the NFPA. It is always helpful to know the quantity discount prices that apply for each publication since considerable savings can be effected. For example, if 25 or more copies of the above reprint on fire causes are purchased, a

25 per cent discount can be obtained. If 500 or more are ordered, a 33⅓ per cent discount can be obtained. The quantities, however, *must be requested in a single order and sent to a single address.*

The "Book and Pamphlet" service of NFPA is also worth considering. For this, an NFPA member fire department merely deposits a certain amount (minimum $25) with the NFPA Publications Department, then, as new books are issued, they are sent automatically to the fire department, many times with a generous pre-publication discount. When the initial deposit is almost expended, the fire department is notified so that it can continue the service. This service is available *only* to Individual Associate Members or Member Fire Departments of NFPA.

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Bulletin No. 2434-BB describes and illustrates easy operation of ICR Model resuscitator, inhalator, aspirator. Write to Department F-2, *Ohio Chemical and Surgical Equipment Company*, Madison, Wisconsin. . . . Just out is a simple attachment that converts any power drill ¼-inch to ½-inch into a variable angle tool — for use in cramped quarters — for drilling at any angle up to 52 degrees. Illustrated catalog free from *Glenwood Gyro-Drive, Inc.*, Glenwood, Minnesota. . . . "Firo" is the name for a new, improved ¾-inch and 1-inch sized booster hose serviceable in coldest weather and extreme conditions — developed by Eureka Fire Hose Division, *United States Rubber Company*, 211 Passaic Street, Passaic, New Jersey.

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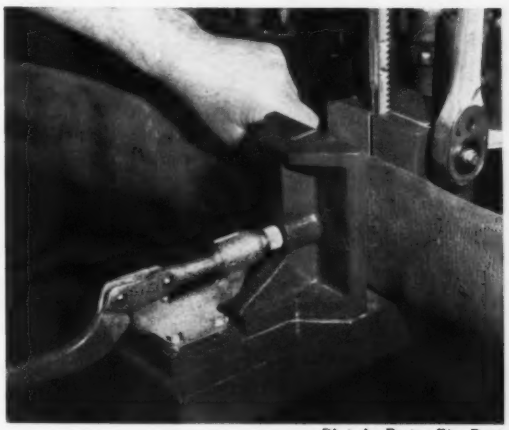

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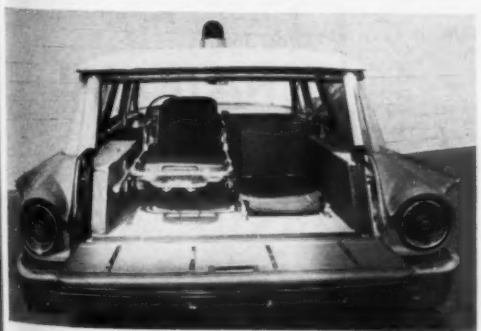

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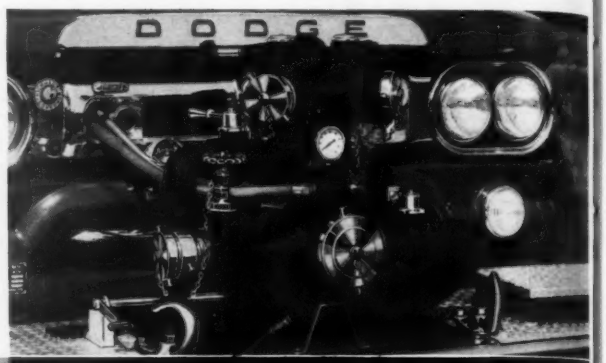

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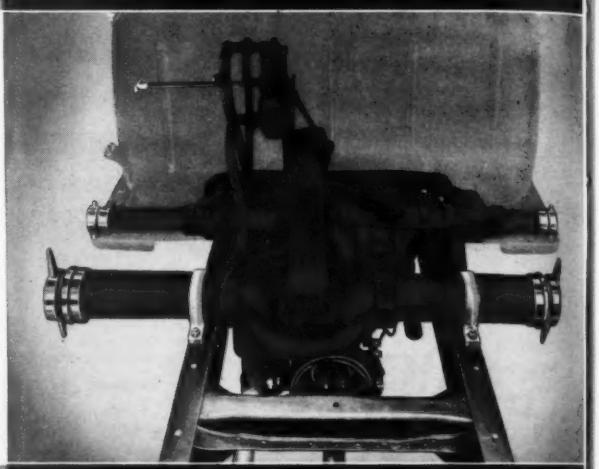

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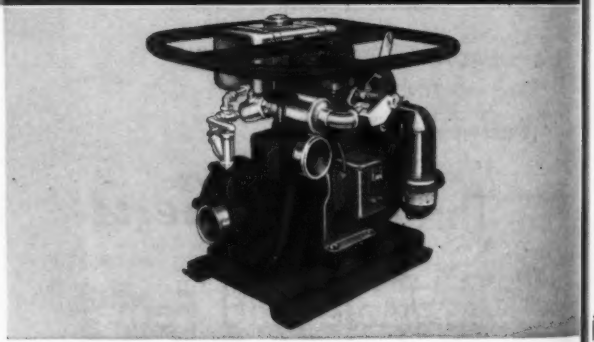

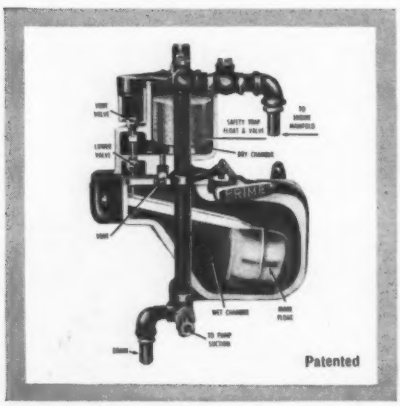

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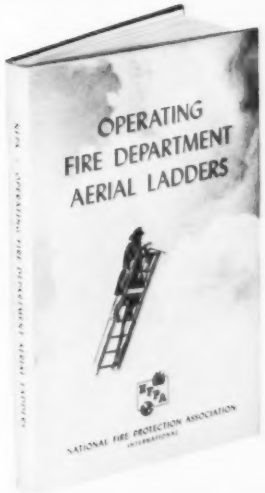

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